



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**EFFECTIVENESS OF UNITED STATES-LED
ECONOMIC SANCTIONS
AS A COUNTERPROLIFERATION TOOL AGAINST
IRAN'S NUCLEAR WEAPONS PROGRAM**

by

Joel S. Millwee

December 2015

Thesis Advisor:

Co-Advisor:

James A. Russell

Zachary S. Davis

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE December 2015		3. REPORT TYPE AND DATES COVERED Master's thesis
4. TITLE AND SUBTITLE EFFECTIVENESS OF UNITED STATES-LED ECONOMIC SANCTIONS AS A COUNTERPROLIFERATION TOOL AGAINST IRAN'S NUCLEAR WEAPONS PROGRAM			5. FUNDING NUMBERS	
6. AUTHOR(S) Joel S. Millwee				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____N/A____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) The use of financial interdiction to disrupt the development of weapons of mass destruction (WMD) and their components is an option in the so-called counterproliferation toolkit. The effectiveness of economic counterproliferation interdiction operations is frequently debated; however, counterproliferation operations have successfully stopped some global WMD illicit trade. What is unknown is the degree to which counterproliferation has inhibited further proliferation of WMD. Understanding the effectiveness of U.S.-led financial interdiction efforts against Iran's nuclear weapons program has significant policy implications. U.S. policy makers need to know whether their current financial interdiction operations are effective at stopping or delaying Iran's nuclear weapon program. Evidence from the International Atomic Energy Agency indicates that the current U.S. economic counterproliferation strategy against Iran's nuclear weapons program failed to slow down Iran's nuclear program as uranium enrichment increased despite implementation of further economic sanctions; however, evidence indicates the overall counterproliferation strategy eventually brought Iran to the negotiation table, thus temporarily halting further nuclear weapons development. The final result of U.S.-led economic counterproliferation policy, along with the use of other counterproliferation tools, ultimately has been effective at disrupting and temporarily halting Iran's nuclear weapons program.				
14. SUBJECT TERMS financial interdiction, Iran, counterproliferation, weapons of mass destruction			15. NUMBER OF PAGES 67	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

**EFFECTIVENESS OF UNITED STATES-LED ECONOMIC SANCTIONS
AS A COUNTERPROLIFERATION TOOL AGAINST
IRAN'S NUCLEAR WEAPONS PROGRAM**

Joel S. Millwee
Lieutenant Commander, United States Navy
B.S., Abilene Christian University, 1999
M.S., Abilene Christian University, 2005

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(MIDDLE EAST, SOUTH ASIA, SUB-SAHARAN AFRICA)**

from the

**NAVAL POSTGRADUATE SCHOOL
December 2015**

Approved by: James A. Russell, Ph.D.
Thesis Advisor

Zachary S. Davis, Ph.D.
Co-Advisor

Mohammed M. Hafez, Ph.D.
Chair, Department of National Security Affairs, Graduate School
of International Graduate Studies

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

The use of financial interdiction to disrupt the development of weapons of mass destruction (WMD) and their components is an option in the so-called counterproliferation toolkit. The effectiveness of economic counterproliferation interdiction operations is frequently debated; however, counterproliferation operations have successfully stopped some global WMD illicit trade. What is unknown is the degree to which counterproliferation has inhibited further proliferation of WMD. Understanding the effectiveness of U.S.-led financial interdiction efforts against Iran's nuclear weapons program has significant policy implications. U.S. policy makers need to know whether their current financial interdiction operations are effective at stopping or delaying Iran's nuclear weapon program. Evidence from the International Atomic Energy Agency indicates that the current U.S. economic counterproliferation strategy against Iran's nuclear weapons program failed to slow down Iran's nuclear program as uranium enrichment increased despite implementation of further economic sanctions; however, evidence indicates the overall counterproliferation strategy eventually brought Iran to the negotiation table, thus temporarily halting further nuclear weapons development. The final result of U.S.-led economic counterproliferation policy, along with the use of other counterproliferation tools, ultimately has been effective at disrupting and temporarily halting Iran's nuclear weapons program.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION AND METHODOLOGY	1
II.	BACKGROUND	3
A.	COUNTERPROLIFERATION VS. NONPROLIFERATION	3
B.	U.S. NONPROLIFERATION POLICY AND INTERNATIONAL REGIMES	4
C.	U.S. COUNTERPROLIFERATION POLICY	7
D.	U.S. COUNTERPROLIFERATION POLICY POST SEPTEMBER 11, 2001	9
E.	THE LESSONS OF ABDUL QADEER KHAN FOR COUNTERPROLIFERATION POLICY	15
F.	THE NPT AND IRAN	17
III.	ECONOMIC SANCTIONS AND ENFORCEMENT AGAINST IRAN.....	19
A.	REAGAN THROUGH CLINTON ADMINISTRATIONS	19
B.	GEORGE W. BUSH THROUGH OBAMA ADMINISTRATIONS	20
C.	P5+1 NEGOTIATIONS WITH IRAN	24
D.	ASSISTANCE TO AND FROM THE BANKING INDUSTRY	26
E.	THE PROSECUTION OF THE FINANCIAL INDUSTRY: U.S. TREASURY DEPARTMENT	27
F.	THE PROSECUTION OF THE U.S. BANKING INDUSTRY: U.S. JUSTICE DEPARTMENT	29
G.	U.S. STATE DEPARTMENT ACTIONS.....	31
H.	IRANIAN ADAPTATION	33
IV.	EFFECTS OF FINANCIAL INTERDICTION	35
A.	IRANIAN BREAKOUT TIMELINES AND CENTRIFUGE OPERATIONS	35
B.	ECONOMIC SANCTIONS VERSUS URANIUM DEVELOPMENT	38
C.	EFFECTS OF ECONOMIC SANCTIONS ON IRAN'S ECONOMY	40
V.	CURRENT P5+1 AGREEMENT, POLICY RECOMMENDATIONS, AND CONCLUSION.....	43
A.	POLICY RECOMMENDATIONS	45
B.	CONCLUSION	47

C.	ADDITIONAL RESEARCH OF ECONOMIC INTERDICTION EFFECTIVENESS	48
LIST OF REFERENCES		49
INITIAL DISTRIBUTION LIST		55

LIST OF FIGURES

Figure 1.	Iranian Breakout Timelines to a Nuclear Weapon.....	36
Figure 2.	Centrifuge operations at the Nantanz Fuel Enrichment Plant based on International Atomic Energy Agency Quarterly Reports.	37

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION AND METHODOLOGY

The use of financial interdiction to disrupt the development of weapons of mass destruction (WMD) and their components is one of the options in the so-called counterproliferation toolkit.¹ The net effectiveness of financial interdiction is often debated; however, what is known is that these types of counterproliferation operations have successfully stopped some global WMD illicit trade.² What is unknown is the degree to which counterproliferation has inhibited further proliferation of WMD.

Examining the effectiveness of U.S.-led financial interdiction programs against Iran's nuclear weapons program has significant policy implications. U.S. policy makers need to know if their current financial interdiction operations are effective at stopping or delaying Iran's nuclear weapon program and if further development of a more robust interdiction program can further deteriorate Iran's ability to import materials and delivery systems required for nuclear weapons development. An assessment is warranted regardless of the results and adherence of the current nuclear negotiations with Iran and P5 +1 countries. If Iran does or does not ultimately accept the terms of the agreement to curtail its nuclear program, the United States will still need to interdict illicit financial support for nuclear material and delivery systems Iran may continue to pursue covertly.

The thesis examines U.S.-led multilateral and international nonproliferation and counterproliferation origins and policy, effects of U.S.-led economic counterproliferation policy by analyzing historical evidence and data to determine if current financial interdiction operations were able to hinder or stop Iran from procuring or developing nuclear materials required to continue its nuclear program, and to what degree these operations affected Iran's breakout timeline in developing a nuclear device. Counterproliferation efforts can be considered effective if they increased Iran's breakout timeline by constraining the ability to obtain nuclear materials with which to build

¹ Zachary S. Davis, "Bombs Away: Interdicting Proliferation," *The American Interest* 4, no. 3. January, 2009. <http://search.proquest.com/docview/224659156?accountid=12702>.

² Andrew C. Winner, "The Proliferation Security Initiative: The New Face of Interdiction," United States Naval War College, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA520253>.

nuclear devices through illicit trading or forced Iran to make difficult economic choices. Conversely, the efforts are ineffective if the breakout timeline decreased or did not otherwise affect Iranian decision-making. If deemed ineffective, the thesis will argue how the U.S. can further develop its counterproliferation policy and operations to provide a more robust strategy. It is possible that any changes in U.S.-led counterproliferation policy would have no effect on Iran's nuclear program, because it is possible that Iran is truly committed to developing a nuclear weapon and cannot be stopped. If this were the conclusion, military kinetic action would be the only option left to curtail Iran's nuclear weapon inevitability.

II. BACKGROUND

A. COUNTERPROLIFERATION VS. NONPROLIFERATION

The proliferation of weapons of mass destruction is a top priority for the United States and global security. Nuclear weapons have the ability to inflict massive damage and therefore represent a threat to national, regional, and global stability.³ The spread of nuclear devices, materials, components, and related technologies have led to the creation of several international and multilateral agreements to prevent such weapons from proliferating. Most recent operations have involved nonproliferation initiatives led by the United States, which has increased the level of cooperation among partner countries. Counterproliferation efforts on the other hand have remained largely impromptu and involved fewer partners.⁴

Counterproliferation is closely related to nonproliferation; however, both terms are very distinct concepts in combating the proliferation of weapons of mass destruction. “Nonproliferation broadly denotes the means and methods for preventing the acquisition, transfer, discovery, or development of materials, technology, knowledge, munitions/devices or delivery systems related to WMD.”⁵ Counterproliferation is an attempt to, “(1) directly forestalling, rolling back, or eliminating efforts to proliferate WMD, and (2) preventing a WMD-armed actor from realizing any benefit from owning or employing these weapons.”⁶ The United States and its partners have continually used several counterproliferation instruments in order to prevent the proliferation of nuclear weapons. These so-called counterproliferation tools have included the following: diplomatic, information, military, economic, finance, intelligence

³ Arms Control Today, “National Strategy to Combat Weapons of Mass Destruction December 2002,” January 1, 2003, <http://www.armscontrol.org/print/1184>.

⁴ Justin Anderson, Thomas Devine, and Rebecca Gibbons, “Nonproliferation and Counterproliferation,” *International Relations*, accessed on March 7, 2015, <http://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0026.xml>.

⁵ Ibid.

⁶ Ibid.

and law enforcement.⁷ The focus of the thesis is on financial interdiction, which falls into the counterproliferation category.

B. U.S. NONPROLIFERATION POLICY AND INTERNATIONAL REGIMES

The formation of U.S. nonproliferation policy began with the Manhattan Project and early efforts to control the spread of nuclear technology. On June 14, 1946, the United States offered a proposal to the United Nations Atomic Energy Commission (UNAEC) called the Baruch Plan. The plan proposed the establishment of an Atomic Development Authority (ADA) under the auspices of the fledgling United Nations. The Authority created an international effort to oversee the use of nuclear energy and to avert potential nuclear proliferation. Another influential study, the Acheson-Lilienthal Report, echoed the call for the formation of the Atomic Development Authority, “to oversee the mining and use of fissile materials, the operation of all nuclear facilities that could produce weaponry, and the right to dispense licenses to those countries wishing to pursue peaceful nuclear research.”⁸ The Baruch proposal never came to fruition as the Soviet Union objected to the U.S. nuclear monopoly that would be perpetuated under the plan and ultimately refrained from voting in the December 30, 1946, UNAEC resolution to form the ADA, thus killing the proposal.⁹

U.S. policy further advanced when President Dwight D. Eisenhower gave a 1953 address called “Atoms for Peace” to the United Nations. In this address, Eisenhower proposed the transfer of nuclear technology and material to countries for peaceful purposes. This proposal was the starting point for the formation of the International Atomic Energy Agency (IAEA) and bolstered the U.S. Atomic Energy Act allowing for peaceful nuclear assistance. The IAEA was placed in charge of verifying that non nuclear weapon possessing member states’ nuclear programs were for peaceful purposes. Additionally under the 1968 Nuclear Nonproliferation Treaty (NPT), the IAEA received

⁷ Davis, “Bombs Away.”

⁸ United States Department of State, “The Acheson-Lilienthal & Baruch Plans, 1946,” Office of the Historian, accessed on March 10, 2015, <https://history.state.gov/milestones/1945-1952/baruch-plans>.

⁹ Ibid.

more authority for inspecting suspected nuclear weapons programs.¹⁰ The NPT and IAEA are discussed further in the thesis. What is most important, however, is the central role they played in the development of internationally accepted nonproliferation norms of behavior.

In addition to U.S. policy initiatives, the U.S. pioneered nonproliferation laws to complement IAEA enforcement tools. One of those laws was crafted out of what was called a “critical turn” in U.S. nonproliferation policy. The 1978 Nuclear Nonproliferation Act (NNPA) was in response to the 1974 Indian nuclear test and other potential states that were operating outside of the NPT. The new law required strict safeguards for countries that wished to acquire nuclear technologies and supplies. The primary objective of the NNPA was “to make the international nuclear fuel cycle a less attractive platform from which to develop nuclear weapons. The NNPA envisioned sticking to a once-through fuel cycle that would avoid using separated plutonium, or separated uranium-233 (U-233), or HEU.”¹¹ Additionally, the NNPA had significant influence on nuclear export controls, as it required extensive full scope safeguards as a condition of supply.¹²

The Nuclear Suppliers Group (NSG) was additionally formed in 1974 to implement nuclear export guidelines that would contribute to the nonproliferation of nuclear weapons. The NSG formally adopted the same additional NNPA provisions in 1992, after the bombshell revelation of Iraq’s pre-1991 weapons of mass destruction program. In addition to the 1992 provisions, the NSG adopted even stricter guidelines for the export of nuclear related supplies and developed additional protocols for the transfer of dual-use equipment, material, and technologies in order to safeguard against furthering the nuclear cycle.¹³ This meant that countries attempting to import nuclear technology must accept safeguards on the full scope of their nuclear programs, and cannot possess

¹⁰ George Bunn, “The Nuclear Nonproliferation Treaty: History and Current Problems,” *Arms Control Today*, accessed on March 7, 2015, http://www.armscontrol.org/act/2003_12/Bunn.

¹¹ Sharon Squassoni, “LOOKING BACK: The 1978 Nuclear Nonproliferation Act,” *Arms Control Today*, December 4, 2008, https://www.armscontrol.org/act/2008_12/lookingback_NPT.

¹² Ibid.

¹³ Nuclear Suppliers Group, Accessed on October 8, 2015, <http://www.nuclearsuppliersgroup.org/en/>.

undeclared or off limits nuclear activities. These reforms coincided with efforts by the IAEA to prevent a repeat of the Iraq situation in which Saddam Hussein's regime possessed many covert nuclear facilities while remaining a member in good standing of the NPT and IAEA.

The NSG, in coordination with the IAEA, adopted several other mechanisms in order to safeguard against illicit transfer of nuclear goods. In 2005, the NSG developed a "fallback" safeguard provision if the IAEA could no longer execute its authority over a country's nuclear program. The fallback safeguard was intended for supplier and receipt states to take appropriate measures to assure nuclear materials would not be transferred to the uncooperative state. In 2010, the NSG formed a technical group in order to keep pace with dual-use technologies. The group continually updates the IAEA on additional trigger list items because of the potential nuclear cycle or weapons manufacturing ramifications of those newly designed dual-use technologies.¹⁴

In addition to the NSG, the end of the Cold War brought further changes with respect to addressing international nuclear security concerns that involved dual-use technologies and the export of those items. An agreement was established called the Wassenaar Arrangement (WA). The arrangement was formalized in December 1995 with 33 countries signing the agreement, to include the United States. Like the NSG, the WA maintains a control list of dual-use components. The control list is used to report on illicit transfers and denials outside of the arrangement members. Additionally, the arrangement allowed the exchange of sensitive dual-use technologies.¹⁵ Like the NSG, the WA lacks enforcement mechanisms and is voluntary.

United States nonproliferation policy, laws, and initiatives, which include partnering with the Nuclear Suppliers Group and Wassenaar Arrangement, have been largely effective at curtailing the proliferation of nuclear weapons, except in cases where a state is truly committed to building a nuclear device. Atoms For Peace initially failed to

¹⁴ Nuclear Suppliers Group.

¹⁵ Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-use Goods and Technologies, Accessed on October 12, 2015, <http://www.wassenaar.org/introduction/howitworks.html>.

have the intended effect of stopping the proliferation of nuclear weapons. Additionally, many of the international nonproliferation regimes created to facilitate nonproliferation have had limited success in regulating the import and export of controlled items. These items have still found a path to states that wished to develop a nuclear weapon. Some of the mechanisms developed may have safeguarded against some illicit transfers; however, by and large countries such as Iran have been able to import required nuclear materials and technologies for their weapons program. Iran has been able to work around NSG initiated IAEA full-scope safeguards by engaging countries that have not signed the nonproliferation initiatives, in addition to the purchase of illicit goods through black market networks. Furthermore, nonproliferation agreements often lacked significant enforcement tools, and simply asked participating states to adhere to the nonproliferation policy of controlling nuclear trade.

C. U.S. COUNTERPROLIFERATION POLICY

The formation of U.S. counterproliferation policy can be traced to the Clinton Administration, largely as a result of the aftermath of the first Gulf War. The Clinton Administration's after action report given to Congress, along with the 1993 Department of Defense review, found deficiencies in U.S. capabilities to combat WMD.¹⁶ Initial steps in the development of counterproliferation policy emerged in December 1993 with the launch of the Defense Counterproliferation Initiative (CPI). The primary objective of the policy was to warn potential adversaries of the United States that the use of weapons of mass destruction would not deter U.S. application of military force. In May 1994, Department of Defense Counterproliferation Policy further advanced the concept, and by July 1996, DOD had more clearly defined counterproliferation responsibilities and relationships between different WMD organizations.¹⁷

Additionally in April 1996, the Department of Defense Counterproliferation Council was formed by the Secretary of Defense to insure the proper training, equipping,

¹⁶ The Air University, "The Origin of Counterproliferation," Accessed on March 10, 2015, <http://www.au.af.mil/au/awc/awcgate/xon/definition.htm>.

¹⁷ Ibid.

and exercising of U.S. military forces in counterproliferation operations.¹⁸ The U.S. defense policy on counterproliferation focused on five Nuclear, Biological, and Chemical (NBC) areas:

1. Prevent the proliferation of NBC weapons and their means of delivery;
2. Roll back proliferation where it has occurred;
3. Deter and prevent the use of NBC weapons against the United States, its allies, and United States and allied forces; and,
4. Adapt U.S. military forces, planning, doctrine and training to operate effectively against the threats posed by NBC weapons and their means of delivery.
5. Detect, prevent, defeat, and manage the consequences of NBC materials or weapons use by terrorists.¹⁹

Goldman School of Public Policy at University of California Berkley professor and former Assistant Secretary of Defense for Global Strategic Affairs Michael Nacht also traced the history of interdiction as an instrument to counterproliferation capabilities to the 1990s.²⁰ However, Professor Nacht pointed to the ending of the Cold War when it appeared that many nations had renewed interests in obtaining nuclear weapons to defend themselves against regional adversaries, such as South Korea and Taiwan. The United States used a counterproliferation deterrence policy as part of its objective to dissuade these countries from pursuing a nuclear weapon. The U.S. deterrence policy provided South Korea and Taiwan protection from potential regional adversaries by conventional military and nuclear defense agreements. Additionally, countering Iraq's secret weapons of mass destruction (WMD) program discovered by the United States also accelerated the development of Clinton counterproliferation policy.²¹ Furthermore, the underestimates of Iraq's WMD programs caused analyst to overcompensate for intelligence gaps, which led to even further acceleration of counterproliferation policy and ultimately led to the flawed 2002 National Intelligence Estimate.²² Counterproliferation deterrence policy described

¹⁸ Air University, "Origin of Counterproliferation."

¹⁹ Ibid.

²⁰ Michael Nacht, "U.S. Counterproliferation Policy," Wilson Center International Security Studies Minutes, January 27, 2005, <http://www.wilsoncenter.org/event/us-counterproliferation-policy>.

²¹ Ibid.

²² Central Intelligence Agency, "Iraq's WMD Programs: Culling Hard Facts from Soft Myths," November 28, 2003, <https://www.cia.gov/news-information/press-releases-statements/press-release-archive-2003/pr11282003.html>.

by Professor Nacht appears to be still relevant today and the policy continues to discourage nuclear weapons development in East Asia.

Before September 11, 2001 (9/11), counterproliferation policy appeared to be primarily focused on state actors, with very little attention given to non-state actors and terrorists groups. The focus of counterproliferation on nuclear armed state actors and deterring further state proliferation allowed the AQ Khan network to thrive and operate undeterred until the eventual exposure in 2004. Previous presidential administrations should have focused more resources on non-state actors, especially third party intermediaries working on behalf of states. If they had, the Khan network would have possibly been stopped earlier and less global proliferation would have occurred. An eventual turn in focus to non-state actors did change with the new counterproliferation strategy implemented by the George W. Bush Administrations as a result of the 9/11 terrorist attacks.

D. U.S. COUNTERPROLIFERATION POLICY POST SEPTEMBER 11, 2001

After the 9/11 attacks on the World Trade Center in New York and the Pentagon in Washington, DC, the George W. Bush Administration refocused even more attention on counterproliferation strategy. The Pentagon developed four objectives in response to the elevated concern over WMD proliferation; “First, to keep WMD technology out of the wrong hands; second, to eliminate or destroy WMD capabilities should proliferation occur; third, to develop the capacity to fight in a WMD environment, if necessary; and fourth, to mitigate environmental consequences should WMD use by an adversary occur.”²³ Overall, U.S. policy toward counterproliferation of weapons of mass destruction was overshadowed by the parallel focus on counterterrorism activities.²⁴

In addition to the reinvigorated Department of Defense counterproliferation strategy, the Bush Administration highlighted the threat of potential state and non-state

²³ Ibid.

²⁴ Ibid.

actors procuring and trading weapons of mass destruction.²⁵ As part of their new strategy, the Administration developed financial interdiction as a key piece to the broader counterproliferation policy. The Administration continued to stress the importance of nonproliferation policy, while “elevating the status of proactive counterproliferation efforts to deter and defend against WMD and missile threats as well as effective consequence management should such weapons be used.”²⁶

The Administration further crafted and led the charge with United Nations Security Council Resolution (UNSCR) 1540, which affirmed proliferation of weapons of mass destruction as well as their delivery systems was not acceptable state behavior. Additionally, the Resolution affirmed actions would be taken against any actor that may threaten world peace through the proliferation of WMD and encompassed the prevention of WMD procurement.²⁷ UNSCR 1540 has been extended three times, 2011 being the latest extension. The 2011 addendum is in effect until 2021 and continues the original mandate that “the proliferation of nuclear, chemical and biological weapons and their means of delivery constitute a threat to international peace and security.”²⁸ Additionally, the 1540 Committee continues to facilitate technical assistance and cooperation with international organizations to further counter the proliferation of nuclear materials and technologies.²⁹

Juan C. Zarate, a former Bush National Security Council staffer and a Senior Advisor for the Center for Strategic and International Studies, observed the George W. Bush Administration used “a new brand of financial war against rogue regimes, terrorist groups, and criminal syndicates. By leveraging American global

²⁵ Jason D. Ellis, “The Best Defense: Counterproliferation and U.S. National Security,” The Center for Strategic and International Studies, *The Washington Quarterly* 26: 2, <http://wmdcenter.DoDlive.mil/files/2012/02/the-best-defense.pdf>.

²⁶ Ibid., 2.

²⁷ United States Department of State, “UN Security Council Resolution 1540,” Accessed on October 8, 2015, <http://www.state.gov/t/isn/c18943.htm>.

²⁸ United Nations, 1540 Committee. Accessed on October 12, 2015, <http://www.un.org/en/sc/1540/>.

²⁹ Ibid.

economic predominance, the U.S. has isolated such actors from the financial system.”³⁰ The use of Iranian sanctions was an example of this new financial war. This new take on the old technique of financial coercion allowed the United States to more effectively use “financial tools, pressure, and market forces to leverage the banking sector, private-sector interests, and foreign partners to isolate rogue actors from the international financial and commercial systems and eliminate their funding sources.”³¹ The Obama Administration has continued and relies heavily on sanctions against Iran’s economy in an attempt to change Iran’s behavior. Economic sanctions cannot solve all of the United State’s perceived security issues; however, the newly enhanced financial warfare techniques can affect behavior of an adversary.³²

After the 9/11 attacks, the United States went on the offensive against the financing of terrorism.

There were three primary themes defining this campaign that shaped the environment and evolution of financial power after 9/11: the expansion of the international anti-money laundering regime; the development of financial tools and intelligence geared specifically to dealing with issues of broad national security; and the growth of strategies based on a new understanding of the centrality of both the international financial system and the private sector to transnational threats and issues pertaining to national security.³³

The change in tactics against terror organizations and proliferation networks completely overhauled the way banks and other financial institutions operated in this new environment. Additionally, the change in post-9/11 tactics impacted how foreign nations addressed illicit financing. Zarate concluded, “Economic sanctions and financial influence are now the national security tools of choice when neither diplomacy nor military force proves effective or possible.”³⁴

³⁰ Juan Carlos Zarate, *Treasury’s War: The Unleashing of a New Era of Financial Warfare* (New York: Public Affairs, 2013), 87, http://www.strategicstudiesinstitute.army.mil/pubs/Parameters/issues/Winter_2013/9_Zarate.pdf.

³¹ Ibid., 88.

³² Ibid., 88.

³³ Ibid., 89.

³⁴ Ibid., 89.

In the immediate aftermath of the attacks of 9/11, the Bush Administration ushered in new counterproliferation tactics, primarily being reinvigorated financial levers and interdiction, though economic coercion was not a new tactic in international relations. The new counterproliferation strategy decreased overall global proliferation of nuclear materials and technologies; however, the new strategy failed to adequately address some state-sponsored proliferation, as Iran continued to further develop its nuclear weapons program. In addition to the Bush Administration policy changes, the United States led the charge in extending United Nation Security Council Resolution 1540. UNSCR 1540 stated and reaffirmed that nuclear proliferation is a security risk and continued to mandate the obligation of enacting and enforcing proliferation laws; however, UNSCR 1540 also failed to stop Iran from further development of its nuclear weapons program. The United States and other partner countries have additionally attempted to use the United Nations Security Council to further alter Iran's nuclear behavior; however, Russia and China have often interjected with their veto ability thus killing any new UN Security Council Resolutions or international sanctions against Iran.

In Zarate's analysis, there are practically no other counterproliferation tools left to persuade or alter a specific countries nuclear agenda, especially if a state is determined to have an illicit nuclear weapons program. It is clear that economic interdiction tools are not only the first choice, but are the only choice left in countering illicit nuclear behavior. Military force is unlikely to be used to change Iran's nuclear behavior, and may only further entrench its nuclear agenda. Further complicating the use of military force is most international partners do not want to address proliferation in this manner for a variety of reasons. Using unilateral military force is additionally complicated, as the United States has been in perpetual war on two fronts in the Middle East in Afghanistan and Iraq. Furthermore, multilateral and international diplomatic coercion has largely failed to persuade state actors from continuing a nuclear weapons program. Economic interdiction is practically the only instrument left on the table for Administrations to use in an attempt to persuade nuclear proliferating behavior, though past use of financial levers by themselves have not resulted in changed nuclear behavior.

Andrew C. Winner, a professor at the United States Naval War College, offers a counter argument to the effectiveness of the Bush Administration's use of counterproliferation activities. According to Professor Winner, the Administration used counterproliferation more effectively and frequently than previous Administrations, and was now the "primary pillar" that engaged WMD. The interdiction of shipments was placed at the forefront of devices used to halt illicit transfers, ahead of the more traditional categories of deterrence, defense, and mitigation. Though the new pillar did not mention strengthening multilateral actions, the 2002 incident that involved the North Korean freighter *So San* was an example of such operations. The North Korean cargo ship was suspected of transporting WMD material to the Middle East and, as the ship approached Yemen, the United States asked Spain to interdict the vessel. Though the ship had issues with registration, which gave Spain the international authority to board, the discovered scud missile parts were allowed to continue to Yemen. The *So San* incident highlighted critical problems with invoking interdiction operations: the counterproliferation policy lacked structure, and participation was voluntary.³⁵

Overall, the Bush Administration wished to work outside the more formal legal international agreements and preferred informal multilateral partnerships. This type of strategy allowed the Administration to receive the strongest commitment possible from partner countries in a limited time frame. The *So San* incident further illustrated the need for an agreement with like-minded counterproliferation nations to streamline information and operations, which would be critical to all future interdiction activities. On May 31, 2003, six months after the *So San* incident, President Bush announced the Proliferation Security Initiative (PSI), which was one of many counterproliferation measures implemented during Bush's tenure. The PSI was an offshoot of the U.S. National Strategy to Combat Weapons of Mass Destruction that was issued in December 2002. The primary task of the PSI was designed to build capability among cooperating nations

³⁵ Winner, "The Proliferation Security Initiative."

to interdict the transfer of weapons of mass destruction (WMD), their materials, and delivery systems.³⁶

Along with strengthening the PSI, the Obama administration supported further economic sanctions against the nuclear proliferating nation of Iran, which resulted in United Nations Security Council Resolution 1929. UNSCR 1929 passed in 2010 and was the fourth round of sanctions against Iran. UNSCR 1929 targeted 41 individuals and entities to include; banking, defense, and shipping sectors. Additionally, UNSCR 1929 stated nations should no longer allow Iran to procure enrichment components or technologies and prevent the transfer of conventional military arms to include; missiles and artillery. The UN notified that Iran if they stopped all enrichment activities, the UN would suspend all sanctions. Furthermore, the UN indicated that it would prefer to work diplomatically with Iran and work toward a permanent solution.³⁷

Along with United Nations Resolution 1929, Executive Order (EO)-Authorizing the Implementation of Certain Sanctions Set Forth in the Iran Freedom and Counter-Proliferation Act of 2012 and Additional Sanctions with Respect to Iran signed by President Obama, authorized the Treasury Department in conjunction with the Department of State to direct sanctions toward any significant foreign financial institution's transactions in relation to the Iranian Rial. Additionally, the EO bars all Iranian property and interests located in the United States. Furthermore, the EO targets individuals who provide support to the Iranian regime, to include Iranians located in the United States.³⁸

³⁶ United States Department of State, Proliferation Security Initiative, Accessed on February 26, 2015, <http://www.state.gov/t/isn/c10390.htm>.

³⁷ United Nations, "Security Council Imposes Additional Sanctions on Iran, Voting 12 in Favour to 2 Against, with 1 Abstention," United Nations Press Releases, June 9, 2010, <http://www.un.org/press/en/2010/sc9948.doc.htm>.

³⁸ The White House Office of the Press Secretary, "Executive Order -- Authorizing the Implementation of Certain Sanctions Set Forth in the Iran Freedom and Counter-Proliferation Act of 2012 and Additional Sanctions with Respect To Iran," accessed on March 7, 2015, <http://www.whitehouse.gov/the-press-office/2013/06/03/executive-order-authorizing-implementation-certain-sanctions-set-forth-i>.

Though the Bush Administration may have used counterproliferation more effectively or more often than previous presidents, the policy was arguably still largely ineffective at halting states that were committed to illicit nuclear expansion. The development of the PSI was a great idea, but the multilateral agreement was voluntary and lacked the teeth to fully stop the proliferation of nuclear goods. President Obama doubled down on the PSI, instituted further economic sanctions against Iran's nuclear program, and pursued United Nation remedies; however, evidence gathered the current research indicates the increase in economic sanctions alone were ineffective at halting or slowing down Iran's enrichment program. It is important to note that overall counterproliferation strategy spanning multiple presidencies and the use of various tools eventually brought Iran to the P5+1 negotiations, which has temporarily halted Iran's nuclear weapons program.

E. THE LESSONS OF ABDUL QADEER KHAN FOR COUNTERPROLIFERATION POLICY

Abdul Qadeer Khan is celebrated and vilified as the “father of the Pakistani nuclear bomb.” A.Q. Khan was in charge of the Khan Research Laboratories and his illicit nuclear trading network was exposed in 2004. Over a two-decade time period, A.Q. Khan proliferated nuclear weapon designs, components, and materials by circumventing international nonproliferation rules. Khan used legitimate shipping and manufacturing hubs to provide his services. Additionally, Khan laundered his proceeds through foreign intermediaries, which helped to keep his illicit operation secret. The Khan case illustrated that nonproliferation strategy was ineffective because so-called secondary proliferators, which used loopholes in supply controls, were able to distribute illicit nuclear materials globally.³⁹

In their 2009 book, Dr. James Russell and Dr. James J. Wirtz from the United States Naval Postgraduate School argued, “the most dangerous and imminent threat of the 1990s came not from terrorists but from a WMD supply network based in a state and

³⁹ Sharon Squassoni, “Closing Pandora’s Box: Pakistan’s Role in Nuclear Proliferation,” *Arms Control Today*, April 1, 2004, https://www.armscontrol.org/act/2004_04/Squassoni.

which took advantage of offshore procurement and production possibilities afforded by global economic integration and interdependence.”⁴⁰ Russell and Wirtz argued globalization further advanced the A.Q. Khan network by making it easier to transfer nuclear materials and technologies. Additionally, the Khan network used an elaborate network of individuals and companies to work around the international nonproliferation system in order to fulfill illicit purchases from non-state actors on behalf of state actors.⁴¹

Besides his native Pakistan, Iran was A.Q. Khan’s first significant customer in 1987. Iran eventually told the IAEA it had procured centrifuge technology from Pakistan; however, Iran for years ignored repeated requests from the IAEA for clarification. In 2003, IAEA inspectors observed the centrifuges firsthand and recognized the Khan network designs. These revelations exposed the broad reach of the Khan network, which included nations, like Malaysia, which are not normally associated with nuclear technology but are exploited for its manufacturing infrastructure and loose export controls to produce nuclear components.⁴² The exposure of the AQ Kahn network prompted a new round of international efforts to upgrade the international control regime, which included expanded Nuclear Suppliers Group membership and control lists.⁴³

The A.Q. Khan network was extremely successful at working through loopholes in the systems, which included using skilled manufacturing capabilities that were able to evade export controls. The Khan network was able to utilize free trade zones and complex shipping arrangements to further its ability to transfer nuclear equipment. Furthering the complexity of the network, many companies were unaware the components they were manufacturing could be used for nuclear programs. The Nuclear Supplier Group (NSG) could have done a better job of updating export control lists in

⁴⁰ James A. Russell and James J. Wirtz, *Globalization and WMD Proliferation: Terrorism, Transnational Networks and International Security* (London ; New York: Routledge, 2008), 4.

⁴¹ Ibid., 4.

⁴² David Albright, “The A.Q. Khan Illicit Nuclear Trade Network and Implications for Nonproliferation Efforts,” *Strategic Insights*, v. 5, issue 6 July 2006, <https://calhoun.nps.edu/bitstream/handle/10945/11090/albrightJul06.pdf?sequence=1>.

⁴³ Ibid.

order to close the loopholes exploited by A.Q. Khan.⁴⁴ Overall, international export control of nuclear materials and technology was ineffective at stopping third party intermediary proliferation of nuclear goods. The NSG and WA have continually updated their export control lists; however, as the A.Q. Khan network proved, determined proliferators have and will find ways to work around these international regimes.

F. THE NPT AND IRAN

Iran often refers to the right for a peaceful nuclear program under the Nonproliferation of Nuclear Weapons Treaty (NPT). However, since at least 2004, Iran has obstructed inspections by the International Atomic Energy Agency (IAEA) of their centrifuges, even after the IAEA found traces of uranium at an undeclared nuclear site Nantanz.⁴⁵ Additionally, the IAEA discovered evidence that Iran had an 18-year covert nuclear program. In 2004, the IAEA declared Iran in violation of safeguard requirements, which led to United Nations sanctions requiring Iran to produce data and halt their enrichment program.⁴⁶

According to the November 2007 National Intelligence Estimate (NIE) on Iran's nuclear program, Iran stopped work on nuclear weapons in 2003, but continued covert enrichment and left the option to restart the development process of nuclear weapons open. It remained unclear if weapons activity associated with Iran's nuclear program restarted and if the intention of eventually building nuclear weapon was still on the table. The NIE assessed Iran would more likely enrich its own uranium to produce fissile material covertly for a nuclear weapon if they decided to move forward. Though Iran had apparently stopped its weapons program, it continued to enrich uranium by installing new centrifuges at Nantanz. The NIE concluded with high confidence Iran would not be able to produce enough weapons grade material for a nuclear weapon before 2015.⁴⁷

⁴⁴ Albright, "The A.Q. Khan Illicit Nuclear Trade Network."

⁴⁵ United States Institute of Peace, "Timeline of Iran's Nuclear Activities," The Iran Primer, <http://iranprimer.usip.org/resource/timeline-irans-nuclear-activities>.

⁴⁶ Ibid.

⁴⁷ National Counterproliferation Center, "Iran: Nuclear Intentions and Capabilities," National Intelligence Estimate, November 2007, http://www.counterwmd.gov/files/20071203_release.pdf.

The IAEA has been unable to halt Iran's increased production of Highly Enriched Uranium (HEU). In 2009, evidence surfaced that Iran was building a reactor at the Fordow site, which could be used in the process of procuring plutonium for a nuclear weapon. The nuclear plant was based underground and located at a military complex. By February 2013, Iran had the ability to highly enrich uranium to nearly 20%. In response to IAEA inquiries to the increased production of HEU, Iran responded by announcing that it was developing a nuclear submarine, which could explain the need for possessing HEU. In addition to the increase in HEU production, Iran has significantly developed a commercial nuclear technical expertise. This increase of technical ability in both military and civilian industry has made it harder to detect and interdict materials that are used to produce a nuclear weapon.⁴⁸ Overall, the IAEA has been largely ineffective at changing state-sponsored nuclear behavior, regardless if the country is a signatory of the NPT or not. Pakistan, India, and North Korea all now have nuclear weapons programs, and if and when Iran decides to pursue nuclear weapons, the IAEA alone will be unable to change such nuclear ambitions.

⁴⁸ United States Institute of Peace, "Timeline of Iran's Nuclear Activities."

III. ECONOMIC SANCTIONS AND ENFORCEMENT AGAINST IRAN

Over the last two centuries, the United States Department of the Treasury, with the assistance from the State and Justice Departments, has used the interdiction of global financial transactions and goods against nations and terrorist organizations as a means of accomplishing U.S. foreign policy and national security objectives.⁴⁹ Since 1987, the United States has used financial sanctions to specifically target Iran's ability to develop weapons of mass destruction (WMD) and support of international terrorism. The U.S. Treasury Department has attempted to interdict Iranian banking, oil, and import and export institutions' finances in an effort to curb illicit activities. These sanctions or financial levers are normally administered by the Treasury Department, in coordination with other Cabinet-level Departments using presidential Executive Orders and statutes passed by Congress as authorization.⁵⁰

A. REAGAN THROUGH CLINTON ADMINISTRATIONS

President Ronald Reagan on October 29, 1987, issued Executive Order (E.O.) 12613, which targeted Iranian imports using the Office of Foreign Assets Control. These sanctions were the first time the U.S. used financial interdiction against Iran because of its support and use of terrorism in the Middle East. Using Section 505 of the International Security and Development Cooperation Act of 1985 as the statutory authority, which was the prelude to the Iranian Transactions Regulations, Title 31, Part 560 of the U.S. Code of Federal Regulations, E.O. 12613 was issued to ensure imports from Iran would not

⁴⁹ United States Department of the Treasury, "Frequently Asked Questions and Answers," Resource Center, Sanctions, Answer 1, Accessed on April 16, 2015, <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#1>.

⁵⁰ United States Department of the Treasury, "Frequently Asked Questions and Answers," Resource Center, Sanctions, Answer 207, Accessed on April 16, 2015, <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#207>.

financially support Iranian aggression toward U.S. and U.S. allied flagged merchant shipping in the region.⁵¹

President Bill Clinton issued E.O. 12957 on March 16, 1995, because of the continued Iranian support for international terrorism and pursuit of WMD. E.O. 12957 marks the first time an Executive Order was issued against Iran because of its involvement in establishing a clandestine WMD program. E.O. 12957 prohibited U.S. involvement in Iranian oil development. On May 6th Clinton issued E.O. 12959, using the International Security and Development Cooperation Act, along with the International Emergency Economic Powers Act, which significantly increased economic sanctions against Iran. To clarify both E.O. 12957 and 12959, Clinton issued E.O. 13059 on August 19, 1997, to prohibit most U.S. trade with Iran by any U.S. citizen, no matter where he or she was located.⁵²

The Iran-North Korea-Syria Nonproliferation Act (INKSNA) signed by President Clinton in March of 2000 authorized sanctions on foreign persons or companies determined by the president to have assisted Iran in its nuclear weapons development. The sanctions included a ban on U.S. exportation of arms and dual-use items to Iran. Additionally, the law targeted the Russian Aviation and Space Agency. Payments to the Russian agency for the international space station would be withheld if the Administration suspected Russian support for Iranian WMD and missile development.⁵³

B. GEORGE W. BUSH THROUGH OBAMA ADMINISTRATIONS

President George W. Bush signed Executive Order 13382 on June 28, 2005, which attempted to stop Iranian proliferation activities and support networks. E.O. 13382 was used to address additional concerns found after Clinton E.O. 12938 was signed in

⁵¹ United States Department of the Treasury, “Executive Order 12613, Prohibiting Imports From Iran,” Accessed on April 19, 2015, <http://www.treasury.gov/resource-center/sanctions/Documents/12613.pdf>.

⁵² United States Department of the Treasury, “An overview of O.F.A.C. Regulations involving Sanctions against Iran,” Accessed on April 15, 2015, <http://www.treasury.gov/resource-center/sanctions/Programs/Documents/wmd.pdf>.

⁵³ Kenneth Katzman, “Iran Sanctions,” *Congressional Research Service*, April 21, 2015, 24, <https://fas.org/sgp/crs/mideast/RS20871.pdf>.

1994, which declared a national emergency due to the proliferation of WMD and delivery technologies. E.O. 13382 attempted to halt Iranian access to U.S. financial and commercial intuitions by preventing U.S. citizens and companies from engaging in transactions with Iranian financial intuitions.⁵⁴

On November 10, 2008, the U.S. Treasury Department issued further banking rules involving so-called “U-turn” transfers. U-turn transfers were banking transactions that involved Iranian financial transfers to non-Iranian foreign banks. These types of transfers allowed Iranian access to foreign markets that were blocked by the United States. Additionally, Treasury Department rules were put into place to prohibit any new investments by U.S. citizens, to include lines of credit, in Iran or property controlled by the Iranian government.⁵⁵

In June of 2010, the United Nations Security Council (UNSC) passed Resolution 1929. This resolution was the fourth of a series of UNSC Resolutions (UNSCRs) that sanctioned Iran because of its nuclear weapons program and unwillingness to adhere to International Atomic Energy Agency verification under the Nonproliferation Treaty. UNSCR 1929 called upon all nations to intervene in financial transactions if they could be attributed to Iran’s nuclear weapons program. President Barack Obama signed the Comprehensive Iran Sanctions, Accountability, and Divestment Act of 2010 (CISADA) on July 1, 2010. According to the Department of the Treasury, “This law build(t) upon UNSCR 1929 by strengthening existing U.S. sanctions with respect to the Iranian energy industry, and adds the potential for the imposition of serious limits on foreign financial institutions’ access to the U.S. financial system if they engage in certain transactions involving Iran.”⁵⁶ Additionally, this law targeted individuals and entities that engaged in illicit financial transactions with Iran. The list of persons or entities designated under this law was found under the Treasury Department’s SDN List (Specially Designated

⁵⁴ United States Department of the Treasury, “An overview of O.F.A.C. Regulations.”

⁵⁵ Ibid.

⁵⁶ United States Department of the Treasury, “CISADA, The New U.S. Sanctions on Iran,” Accessed on April 19, 2015, http://www.treasury.gov/resource-center/sanctions/Programs/Documents/CISADA_english.pdf.

Nationals).⁵⁷ The Treasury Department's Office of Foreign Asset Control published this list, which is a part of the overall enforcement-tracking tool used for targeting Iran's financial institutions.⁵⁸

President Obama signed the fiscal year 2012 National Defense Authorization Act (NDAA) on December 31, 2011. Additionally, on February 5, 2012, President Obama issued E.O. 13599. Both the NDAA and E.O. added additional sanctions against Iran. The NDAA and E.O. attempted to halt all property and interests with respect to the Bank of Iran and all other Iranian financial institutions. Furthermore, the federal statute and E.O. targeted individuals deemed by the Secretaries of the Treasury and State Departments to be acting directly or indirectly on the behalf of entities that were in support of Iranian illicit nuclear trade.⁵⁹

President Obama signed Executive Order (E.O.) 13622 on July 30, 2012, which authorized additional sanctions against Iran's energy and oil industries. E.O. 13622 authorized the Secretary of the Treasury, with the consultation of the Secretary of State, "to impose financial sanctions on foreign financial institutions found to have knowingly conducted or facilitated any significant financial transaction with the National Iranian Oil Company (NIOC) or Naftiran Intertrade Company (NICO)."⁶⁰ Additionally, E.O. 13622 authorized new sanctions against financial institutions that purchased oil products from Iran, or institutions that circumvented the NDAA that used illicit payments to procure Iranian oil products. Furthermore, E.O. 13622 authorized cabinet-level officials to

⁵⁷ United States Department of the Treasury, "CISADA."

⁵⁸ United States Department of the Treasury, "Specially Designated Nationals List (SDN)," Resource Center, Accessed on April 15, 2015, <http://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx>.

⁵⁹ United States Department of the Treasury, "Questions Regarding Executive Order 13599 (Blocking Property of the Government of Iran and Iranian Financial Institutions)," Resource Center, OFAC FAQs, Accessed on April 15, 2015, http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/ques_index.aspx#iraneo.

⁶⁰ United States Department of the Treasury, "Frequently Asked Questions and Answers," Resource Center, Sanctions, Answer 216, Accessed on April 15, 2015, <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#216>.

recommend sanctions against individuals and companies that knowingly engaged in the procurement of Iranian oil products.⁶¹

Congress passed the Iran Freedom and Counterproliferation Act of 2012 (IFCA), which was a part of the Fiscal-Year 2013 National Defense Authorization Act. The law provided additional authorization for sanctions against Iran. The law targeted energy, shipping, shipbuilding, transfer of certain metals and other industrial mined materials, software, insurance, and financial transactions from a list of sanctioned individuals and companies. E.O. 13645 issued on June 3, 2013, implemented the IFCA sanctions. E.O. 13645 additionally targeted the Iranian rial, automobile manufacturing, and individuals on the Special Designated Nationals and Blocked Persons (SDN List).⁶²

The Obama Administration and Congress have continued to craft executive orders and laws in order to target Iran's ability to finance its nuclear weapons program and support for global terrorism. Part of the challenge that faced the U.S. Treasury Department was tracing the financial networks that fund illicit procurement of nuclear materials. Tracing these networks often required sophisticated analysis to pick out small pieces of information and put them together to fully understand the intricate network. To accomplish this task, the U.S. Treasury Department formed the Intelligence and Analysis task force in 2004. This task force was in charge of tracking, enforcing, and developing global economic sanctions.⁶³

Leslie Ireland, the head of the U.S. Treasury Department's Intelligence and Analysis task force, argued sanctions imposed by the U.S. Treasury Department put significant pressure on Iran to come to the P5+1 negotiating table. Financial sanctions were effective at influencing Iran's conduct. Bloomberg Business asked Ms. Ireland if

⁶¹ United States Department of the Treasury, "Frequently Asked Questions and Answers," Answer 216.

⁶² United States Department of the Treasury, "Frequently Asked Questions and Answers," Resource Center, Sanctions, Answer 313, Accessed on April 15, 2015, <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#216>.

⁶³ Andrew Mayeda, "U.S. Treasury's Puzzle Solver Helps Shape Sanctions Against Iran," *Bloomberg Business*, April 15, 2015, <http://www.bloomberg.com/news/articles/2015-04-16/treasury-s-puzzle-solver-puts-iran-sanctions-picture-together>.

some within the national security community believed the United States was running out of sanction options against Iran. Ms. Ireland responded by pointing to the fact that the task force has been able to work with U.S. allies and international partners to further increase pressure on Iranian banks costing Iran over \$40 billion in oil exports.⁶⁴

C. P5+1 NEGOTIATIONS WITH IRAN

The P5+1 (China, France, Russia, the United Kingdom, the United States, and Germany) and Iran reached an agreement on November 24, 2013, which halted further Iranian nuclear development and slowed down uranium enrichment. The agreement was called the Joint Plan of Action (JPOA). In return, Iran received limited sanction relief for six months. The JPOA gave Iran a pathway to comply with its Nonproliferation Treaty obligations and follow the protocols of the International Atomic Energy Agency (IAEA) Safeguards Agreement.⁶⁵ An extension of the JPOA has been extended twice. The November 24, 2014, extension was based on increased monitoring and verification of Iran's fuel fabrication for the Tehran Research Reactor and decreased Iran's UF6 enrichment to 2%. The additional June 30, 2015, extension encompassed the continuation of increased monitoring and verification activities by the IAEA on Iran's nuclear program.⁶⁶ The JPOA ultimately led to the current P5+1 negotiations and subsequent Joint Comprehensive Plan of Action agreement, which could be a permanent solution to Iran's self-declared peaceful nuclear program.⁶⁷

On April 2, 2015, the P5+1 parameters of the Joint Comprehensive Plan of Action regarding Iran's nuclear programs had been reached. The agreed framework addressed Iranian enrichment, inspection protocols, sanctions, and reactor issues. Additionally, the agreed framework increased the breakout timeline for Iran to produce a nuclear weapon.

⁶⁴ Mayeda, "U.S. Treasury's Puzzle Solver."

⁶⁵ United States Department of State, "Implementation of the Joint Plan of Action," Accessed on April 26, 2015, <http://www.state.gov/r/pa/prs/ps/2014/01/220054.htm>.

⁶⁶ International Atomic Energy Agency, "Monitoring and Verification in the Islamic Republic of Iran in relation to the extension of the Joint Plan of Action," Board of Governors, December 3, 2014, <https://www.iaea.org/sites/default/files/gov2014-62.pdf>.

⁶⁷ United States Department of State, "Implementation of the Joint Plan of Action."

According to the U.S. Treasury Department, immediate relief of current sanctions against Iran was not part of the agreed framework. Permanent sanctions relief would be implemented once the new agreement is signed and after Iran allowed IAEA-verified inspections of their nuclear facilities. Current sanctions relief reached on November 24, 2013, under the Joint Plan of Action were still in effect. A final agreement will be negotiated by June 30, 2015.⁶⁸

After three additional months of negotiations between the P5+1 countries and Iran, a final agreement had been made on July 14, 2015. The deal cannot be finalized until the U.S. Congress has reviewed and approved the agreement.⁶⁹ According to the Wisconsin Project on Nuclear Arms Control's Iran Watch, in order for the deal to be successful, the U.S. must achieve its four basic tenets set out at the beginning of the negotiations, called the "four ways" to a nuclear weapon. "Three of the four pathways involve Iran's use of declared facilities to make fuel for a nuclear weapon in a "breakout" scenario: 1) Using the Nantanz plant to make highly enriched uranium, 2) Using the Fordow plant to make highly enriched uranium, 3) Extracting plutonium from spent fuel produced at the Arak heavy water reactor. The fourth pathway is Iran's potential use of covert facilities to develop nuclear weapons in a "sneak out" scenario."⁷⁰ Under this agreement, economic and arms embargo sanctions, to include over 18 billion in frozen financial funds will be lifted; however, many of the details have not yet been released on the timeframe of the relief actions.

Over the last four decades, five U.S. presidents have issued 13 Executive Orders and signed numerous laws in an attempt to interdict Iranian financial transactions and goods in order to diminish their ability to support an illicit nuclear weapons program and global terrorist activities. The United States has indicated it will continue to develop and

⁶⁸ United States Department of the Treasury, "Iran Sanctions," Resource Center, Assessed on April 20, 2015, <http://www.treasury.gov/resource-center/sanctions/Programs/pages/iran.aspx>.

⁶⁹ David E. Sanger and Michael R. Gordon, "Iran Nuclear Deal is Reached With World Powers," *New York Times*, July 14, 2015, <http://www.nytimes.com/2015/07/15/world/middleeast/iran-nuclear-deal-is-reached-after-long-negotiations.html>.

⁷⁰ Valerie Lincy and Simon Chin, "How to Evaluate a Nuclear Deal with Iran," *Nuclear Iran Weekly*, Wisconsin Project on Nuclear Arms Control, July 9, 2015, <http://www.iranwatch.org/our-publications/nuclear-iran-weekly/how-evaluate-nuclear-deal-iran>.

plan further financial sanctions against Iran if it continues to pursue a nuclear weapon. A final signed agreement between Iran and the P5+1 will ultimately determine if the United States and their departments are required to continue the interdiction of Iranian financial imports and exports.

The enforcement of presidential Executive Orders and laws passed by Congress sanctioning Iran required coordination and enforcement from several Cabinet-level Departments within the U.S. government. These coordinated actions have negatively affected the Iranian economy and its future economic direction. According to the U.S. Government Accountability Office, “the Iranian economy has consistently underperformed the economies of comparable peer countries across a number of key economic indicators since 2010, when recent sanctions were enacted. In contrast to its peers, Iran’s oil production, oil export revenues, and economic growth estimates have fallen, and its inflation has increased.”⁷¹ The Justice Department and Treasury Departments has continued to target persons, banks, and other financial institutions that violated U.S. sanction laws and regulations. In addition to the prosecution and enforcement of sanctions, the Treasury and Justice Departments has assisted U.S. and international banks in addressing Iran’s illicit financial transactions.⁷²

D. ASSISTANCE TO AND FROM THE BANKING INDUSTRY

One of the primary responsibilities of the U.S. Treasury Department is to assist U.S. and international financial institutions’ abilities to enforce and adhere to sanctions against Iran. “According to Treasury, since 2010, Treasury officials have conducted outreach to more than 145 foreign financial institutions in more than 60 countries as well as to foreign governments, regulators, and other trade groups and associations.”⁷³ In an example of outreach by U.S. Treasury officials, several trips were made to the United

⁷¹ United States Government Accountability Office, “Report to the Chairman, Committee on Homeland Security and Governmental Affairs, U.S. Senate U.S. and International Sanctions Have Adversely Affected the Iranian Economy,” February 2013, Introduction, <http://www.gao.gov/assets/660/652314.pdf>.

⁷² Ibid., 1–17.

⁷³ Ibid., 17–18.

Arab Emirates to discuss newly enacted sanctions against Iran with UAE financial institutions and how better to enforce these regulations.⁷⁴

Financial institutions are crucial to the process of stopping transactions that are blocked by U.S. law or presidential Executive Order. Financial institutions are required to notify the U.S. Treasury Department of improper financial transactions. Additionally, sanction requirements require financial institutions to cut off transactions that “are by, or on behalf of, a blocked individual or entity; (2) are to, or go through, a blocked entity; or (3) are in connection with a transaction in which a blocked individual or entity has an interest.”⁷⁵

Financial institutions may also self-report potential violations of the law to the U.S. Treasury Department. Normally, banks are allowed to further investigate the violations and forward their findings to the Office of Foreign Asset Control (OFAC). After a thorough review of the banking records, the OFAC determines what, if any, violations of the law have occurred. Violations of Iranian sanction laws or presidential Executive Orders may result in a civil judgment of \$250,000 per violation, or twice the amount of the value of the transaction, whichever is greater.⁷⁶

E. THE PROSECUTION OF THE FINANCIAL INDUSTRY: U.S. TREASURY DEPARTMENT

The GAO reported that, “According to Treasury, as of January 2013, OFAC had designated more than 360 individuals and entities—including banks, energy companies, and businesses—linked to Iran’s weapons-of-mass-destruction program and support for terrorism under various Iran-related executive orders. These designations included actions taken under Treasury’s executive order authorities related to the proliferation of weapons of mass destruction or delivery systems for weapons of mass destruction and international terrorism.”⁷⁷ In 2012, the U.S. Treasury Department imposed sanctions

⁷⁴ United States Government Accountability Office, “Report to the Chairman,” 18.

⁷⁵ *Ibid.*, 20.

⁷⁶ *Ibid.*, 21.

⁷⁷ *Ibid.*, 22.

under the Comprehensive Iran Sanctions, Accountability, and Divestment Act (CISADA) upon two foreign banks designated by OFAC.⁷⁸

In one of the two cases, the U.S. Treasury Department found China's Bank of Kunlun was complicit in working with multiple Iranian financial institutions designated by the United States as supporting Iranian WMD programs and terrorist efforts. The Treasury Department specifically found the Chinese bank provided millions of dollars' worth of financial services to Iranian banks designated by the Treasury Department. In response, the U.S. Treasury Department prohibited all U.S. financial institutions from using the Chinese bank, thus blocking all Bank of Kunlun access to the U.S. banking system.⁷⁹ In the second case, the U.S. Treasury Department found the Elaf Islamic Bank in Iraq knowingly facilitated financial transactions and services for designated Iranian banks. Like the Bank of Kunlun, the Treasury Department blocked Elaf Bank's access to the U.S. banking system.⁸⁰

In addition to sanctions, the U.S. Treasury Department has issued punitive actions against financial institutions that are found in violation of Iranian sanction regulations. According to OFAC, the office has imposed 45 civil judgments since 2005 against banks for violating sanction regulations by facilitating financial transactions on behalf of Iranian interests. In one example, the U.S. Treasury announced a \$619 million settlement with ING Direct Bank N.V. because of their involvement in \$1.6 billion worth of illicit Iranian financial transactions.⁸¹

Other federal and state regulators further imposed enforcement actions against financial institutions in coordination with the OFAC. According to the GAO, "For example, in 2005 the Federal Reserve, FinCEN, the New York State Banking Department, the Illinois Department of Financial and Professional Regulation, and OFAC

⁷⁸ United States Government Accountability Office, "Report to the Chairman," 22.

⁷⁹ United States Department of the Treasury, "Frequently Asked Questions and Answers," Resource Center, Sanctions, Answer 207, Accessed on April 15, 2015, <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#216>.

⁸⁰ United States Government Accountability Office, "Report to the Chairman," 22.

⁸¹ Ibid., 23.

announced the assessment of penalties against the Dutch bank ABN AMRO based, in part, on OFAC violations. The agencies jointly assessed \$75 million in penalties against the bank on the basis of findings that it participated in transactions that violated U.S. sanctions laws, as well as findings of the bank's failures related to U.S. anti-money laundering laws and regulations and other banking laws."⁸²

F. THE PROSECUTION OF THE U.S. BANKING INDUSTRY: U.S. JUSTICE DEPARTMENT

The United States Justice Department, through the Criminal Division, National Security Division, and U.S. Attorney's Office has investigated seven banks since 2009 for violations against U.S. sanctions law with respect to Iran. The violations of law originated from the International Emergency Economic Powers Act (IEEPA).⁸³ The IEEPA was signed in 1977 and grants the president authorization against "any unusual and extraordinary threat, which has its source in whole or substantial part outside the United States, to the national security, foreign policy, or economy of the United States, if the president declares a national emergency with respect to such threat."⁸⁴ When financial institutions violate the IEEPA and the regulations associated with the law, the institution may be found criminally liable for its actions.

In all seven cases, the financial institutions' violations of the law were resolved through pretrial settlements, which led to monetary damages and deferred prosecutions. These financial institutions included; HSBC Bank USA N.A., Standard Chartered Bank, ING Bank N.V., Barclays Bank PLC, ABN AMRO Bank N.V., Credit Suisse AG, and Lloyds TSB Bank PLC. In 2012, HSBC Bank USA N.A. settled with the Justice Department for a record amount of \$1.236 billion.⁸⁵

⁸² United States Government Accountability Office, "Report to the Chairman," 23.

⁸³ Ibid., 24.

⁸⁴ United States Department of the Treasury, "United States Code Annotated Title 50. War and National Defense Chapter 35. International Emergency Economic Powers," Accessed on April 26, 2015, <http://www.treasury.gov/resource-center/sanctions/Documents/ieepa.pdf>.

⁸⁵ United States Government Accountability Office, "Report to the Chairman," 25.

Department of Justice (DOJ) officials argued the seven bank's actions constituted "threats to both national security and the integrity of the U.S. financial system posed by the banks' misconduct. Furthermore, in each investigation, the bank systematically removed or obscured payment data that would have revealed the involvement of sanctioned countries and entities, including Iran."⁸⁶ According to federal law enforcement officials, the Credit Suisse AG Bank violated the IEEPA for 11 years by purposely deleting information from banks accounts, such as names, bank names, addresses, and other vital information, in order to circumvent Iran sanctions. The information consisted of deleted payments messages so that financial transactions would not be flagged by U.S. banks as illicit. Additionally, Credit Suisse circumvented OFAC regulations by providing Iranian clients paperwork that indicated how to avoid detection by U.S. officials. Over an 11-year period Credit Suisse was able to assist in the transfer of millions of dollars throughout the U.S. banking system until the DOJ was able to halt the illegal activity.⁸⁷

In 2012, HSBC Holdings, PLC and HSBC Bank USA N.A. agreed to defer prosecutions from the DOJ due to their violations of IEEPA and the Trading With the Enemy Act. The violations occurred in connection with Iran and other sanctioned countries. According to DOJ documents, HSBC Holdings, PLC authorized \$660 million in banned transactions through U.S. financial institutions, including their subsidiary in the United States (HSBC Bank USA N.A.) over a two-decade period. An official from the Federal Reserve indicated that HSBC Holdings, PLC permitted its subsidiaries to allow sanctioned countries, including Iran, to delete their names from U.S. monetary financial transaction messages sent to banks located in the United States. In all seven cases, federal prosecutors deferred prosecutions using prosecutorial discretion because the financial institutions worked diligently at fixing the issues, admitted fault, and cooperated during the investigation.⁸⁸

⁸⁶ United States Government Accountability Office, "Report to the Chairman," 25.

⁸⁷ *Ibid.*, 25.

⁸⁸ *Ibid.*, 26.

In recent developments, the DOJ has charged four companies and five persons for their assistance in providing \$24 million worth of sanctioned goods to the Iranian military and nuclear development industries. The Wisconsin Project reported that “according to a 24-count federal indictment unsealed on April 17, the procurement network conspired to export sensitive American-made electronic components with military applications to Iran via companies in Taiwan and Turkey, in violation of U.S. law. The network allegedly began operating in July 2010 and was still active at the time of the indictment.”⁸⁹

The illicit network provided the Iranian government with microelectronic components made in the United States. One of these U.S.-made components was the uninterrupted power supplies (UPS). The UPS was a critical electronic component for ballistic missile systems and nuclear applications. The illicit trade network illustrated Iran’s ability to adapt and evade sanctions. Some of the methods used included:

transshipment through third countries to mask the final destination; undervaluing goods; falsifying product codes to remove military designations; mingling export-controlled items with non-controlled items to avoid scrutiny; falsifying shipment statements to remove reference to Iranian ports; modifying and tailoring payments to ensure that amounts and bank names would not raise flags; and the use of personal e-mail accounts to discuss how to evade U.S. law.⁹⁰

G. U.S. STATE DEPARTMENT ACTIONS

In addition to the U.S. Treasury and Justice Departments, the State Department assisted in curtailing Iranian illicit economic trade. Most of these actions involved reaching out to countries that knowingly or unknowingly continued to conduct sanctioned trade with Iran. Most of this regulated trade included assistance in procuring materials for weapons of mass destruction and ballistic missile technologies.

According to leaked State Department cables, analyzed by the Institute for Science and International Security, Secretaries Hillary Clinton and Condoleezza Rice

⁸⁹ Wisconsin Project on Nuclear Arms Control, “Illegal Iranian Procurement Network Exposed,” Iran Watch, April 21, 2015, <http://www.iranwatch.org/our-publications/nuclear-iran-weekly/illegal-iranian-procurement-network-exposed>.

⁹⁰ Ibid.

directed the U.S. embassy in Beijing to approach the Chinese government about the transfer of nuclear technology and materials. In 2010, information was made available to the Chinese government that an Iranian company had attempted to purchase five tons of carbon fiber, which is often used in the manufacturing of ballistic missiles and centrifuges, from a Chinese company. The Iranian company was the Shahid Bakeri Industries Group, which is associated with Iran's ballistic missile program and is sanctioned under United Nations Security Council Resolution 1737.⁹¹

Additionally, in 2007, the U.S. State Department asked the Chinese government to stop the immediate transfer of cargo destined to Iran through North Korea. The U.S. government had evidence that the cargo contained jet vanes for missiles and other materials for Iran's ballistic missile program. Chinese officials responded by stating these types of shipments do not exist, and declined to cooperate in the stopping of this transfer and others that were similar in nature. U.S. State Department records indicated a total of 10 illicit transfers to Iran from Chinese companies have occurred, which have consisted of ballistic missile materials and parts.⁹²

In three other similar cases, the U.S. State Department has approached the countries of Germany, Ukraine, and the United Kingdom concerning illicit ballistic missile trade to Iran. In the Germany case, the State Department approached the German government about Iran's attempt to procure items from German companies that manufacture environmental condition simulators for missiles. In the Ukraine case, the State Department notified the Ukrainian government that Iran was procuring steel and other materials used in the manufacturing of missile propellants. Lastly, in the United Kingdom case, the State Department notified their British counterparts that intelligence had surfaced that indicated an Indian company headquartered inside the United Kingdom was involved in providing materials to Iran for its Bushehr reactor. These materials included cladding, thermal insulation, and other required equipment. There was no

⁹¹ Institute for Science and International Security, "State Department Cables: Stopping Iran's and North Korea's Illicit Procurement for their Nuclear and Ballistic Missile Programs," December 10, 2010, <http://isis-online.org/isis-reports/detail/state-department-cables-stopping-irans-and-north-koreas-illicit-procurement/8>.

⁹² Ibid.

further information in the leaked documents concerning whether the three foreign governments cooperated with the U.S. State Department in halting the nuclear materials destined for Iran.⁹³

H. IRANIAN ADAPTATION

According to the GAO, U.S. and international trade, investment, and financial sanctions have damaged Iran's economy and future prospects. Analysis by the GAO has found Iran's economy has underperformed against its peers since the sanctions of 2010 and 2012 have been implemented. Additionally, the GAO observed the sanctions have impacted Iran's oil production, oil export revenue, and gross domestic product (GDP), which all have declined significantly. To combat the deteriorating situation in Iran, the GAO indicates through unclassified reports that "the government of Iran is attempting to adapt to the sanctions through various means, including using alternative payment mechanisms such as barter agreements, but thus far these agreements have not fully offset Iran's reduced oil exports."⁹⁴

According to the unclassified documents, Iran has attempted to circumvent U.S. and international sanctions levied against them. One of the alternate financial avenues Iran has used in an attempt to subvert sanctions is selling oil at discounts to customers willing to pay in their own currency. In another attempt to circumvent sanctions, Iran used so-called barter agreements. One of these barter agreements is with India. Iran has exchanged oil products for food, medicine, and other commercial products. Using barter methods for the selling of oil required Iran to sell below market value. The GAO additionally observed Iran has continued to pursue oil deals with regional partners to include Pakistan and India. However, these potential deals will not offset the decline in oil products destined for the European Union due to the new restrictions imposed by U.S. and international sanctions.⁹⁵

⁹³ Institute for Science and International Security, "State Department Cables."

⁹⁴ United States Government Accountability Office, "Report to the Chairman," 27.

⁹⁵ Ibid., 42–3.

Although Iran's daily business transactions have been negatively affected by the economic sanctions, Iran has continued to use loopholes found in international sanctions. Iran has used of a network of companies that on their face seem legitimate; however, these companies provided a cover for Iranian shipping using false flags of registration. These deceptive tactics are primarily found in tax haven countries such as Malta, Cyprus, the Bahamas, and Hong Kong, which allowed Iran to purchase flags and registries in order to evade international economic sanctions. Additionally, many countries did not report their business activities with Iran, which have often included discounted oil products. Overall, Iran has been successful at adapting and using deceptive tactics in order to avoid the full impact of economic sanctions.⁹⁶

As Iran continually attempted to circumvent U.S. and international economic sanctions with elaborate schemes, the U.S. Treasury, Justice, and State Departments needed to continually coordinate their efforts against Iran and Iran's nuclear accomplices. Though economic sanctions have drastically impacted the Iranian economy, Iran has continued to pursue and develop nuclear materials and technologies. U.S. and international governments must adapt and become more creative in the development of economic sanctions targeting Iran's economy and clandestine behavior, because Iran has continually shown an inability or desire to alter its nuclear development pursuits.

⁹⁶ Reva, Bhalla, "Negotiations Behind U.S. Sanctions Against Iran," *Geopolitical Weekly*, STRATFOR Global Intelligence, July 3, 2012, <https://www.stratfor.com/weekly/negotiations-behind-us-sanctions-against-iran>.

IV. EFFECTS OF FINANCIAL INTERDICTION

According to a June 17, 2015, Wisconsin Project on Nuclear Arms Control report, Iran could produce enough highly enriched uranium to fuel a nuclear warhead using 9,000 first-generation centrifuges operating at the Nantanz Fuel Enrichment Plant in two months. Additionally, Iran could speed up the production of a nuclear weapon using 1,000 more advanced IR-2m centrifuges installed at Nantanz. The Wisconsin Project further reported, “Iran’s stockpile of low-enriched uranium is now sufficient, after further enrichment, to fuel approximately eight nuclear warheads.”⁹⁷ As Iran continues to assert that its nuclear program is peaceful, it has been noted Iran has no current need to enrich uranium to generate nuclear energy because of a 10-year Russian agreement to provide enriched uranium to Iran for its reactor at Bushehr.⁹⁸

A. IRANIAN BREAKOUT TIMELINES AND CENTRIFUGE OPERATIONS

The Wisconsin Project offered Iranian so-called breakout timelines to a nuclear weapon, if they continue to use current centrifuge technology at Nantanz (Figure 1). Though the Wisconsin Project offered these scenarios on Iranian breakout times, and the International for Science and International Security offer similar timelines, there is little unclassified historical data on Iranian nuclear weapon breakout. Due to the lack of data, the analysis conducted for this thesis will specifically examine the Nantanz Enrichment Facility and the number of centrifuges being operated. Nantanz centrifuge operation will be used to argue whether a correlation exists between economic sanctions and uranium enrichment production as a means to further develop material for a nuclear weapon.

⁹⁷ Valerie Lincy and Gary Milhollin, “Iran’s Nuclear Timetable,” Wisconsin Project on Nuclear Arms Control, June 17, 2015, <http://www.iranwatch.org/our-publications/articles-reports/irans-nuclear-timetable>.

⁹⁸ Ibid.

Figure 1. Iranian Breakout Timelines to a Nuclear Weapon.

If Iran feeds its IR-centrifuges with **natural uranium** and operates:

- **9,000 centrifuges** (the number now running):
6.8 months
- **6,104 centrifuges** (the number allowed to be installed under the framework agreement):
10.1 months
- **5,060 centrifuges** (the number allowed to operate under the framework agreement):
1 year

If Iran feeds its IR-centrifuges with **low-enriched uranium** and operates:

- **9,000 centrifuges:** **1.6 months**
- **6,104 centrifuges:** **2.4 months**
- **5,060 centrifuges:** **2.9 months**

Adapted from Valerie Lincy and Gary Milhollin, "Iran's Nuclear Timetable," Wisconsin Project on Nuclear Arms Control, June 17, 2015, <http://www.iranwatch.org/our-publications/articles-reports/irans-nuclear-timetable>.

It is assumed an increase in centrifuge operation results in Iran being able to manufacture weapons-grade uranium at an increased rate, thus causing the breakout timeline to decrease. For reference (Figure 2), is the Wisconsin Project chart of centrifuge operations at the Nantanz Fuel Enrichment Plant based on International Atomic Energy Agency (IAEA) quarterly reports. This chart will be used to examine the effectiveness of financial interdiction.

Figure 2. Centrifuge operations at the Nantanz Fuel Enrichment Plant based on International Atomic Energy Agency Quarterly Reports.

Date of IAEA Inventory	IR-1 Centrifuges Being Fed with UF6	Other IR-1 Centrifuges Installed
17 Feb 2007	0	656
13 May 2007	1,312	820
19 Aug 2007	1,968	656
3 Nov 2007	2,952	0
12 Dec 2007	2,952	?
7 May 2008	3,280	2,624
30 Aug 2008	3,772	2,132
7 Nov 2008	3,772	2,132
1 Feb 2009	3,936	1,968
1 Jun 2009	4,920	2,296
12 Aug 2009	4,592	3,716
2 Nov 2009	3,936	4,920
31 Jan 2010	3,772	4,838
24 May 2010	3,936	4,592
28 Aug 2010	3,772	5,084
5 Nov 2010	4,816	3,610
16 Nov 2010	0	~ 8,426
22 Nov 2010	~4,592	~3,834
20 Feb 2011	~5,184	~2,816
14 May 2011	~5,860	~2,140
28 Aug 2011	~5,860	~2,140
2 Nov 2011	~6,208	~1,792
19 Feb 2012	8,808	348
19 May 2012	8,818	512
21 Aug 2012	9,156	270
10 Nov 2012	9,156	1,258
19 Feb 2013	~8,990	~3,680
15 May 2013	~8,990	~4,565
24 Aug 2013	9,156	6,260
9 Nov 2013	~8,800	~6,620
10 Feb 2014	~9,000	~6,420
14 May 2014	~9,000	~6,420
13 Aug 2014	~9,000	~6,420
15 Oct 2014	~9,000	~6,420
8 Feb 2015	9,156	6,264
17 May 2015	9,156	6,264

Date of IAEA Inventory	IR-2m Centrifuges Being Fed with UF6	IR-2m Centrifuges Installed
19 Feb 2013	0	180
15 May 2013	0	689
24 Aug 2013	0	1,008
9 Nov 2013	0	1,008
10 Feb 2014	0	1,008
14 May 2014	0	1,008
13 Aug 2014	0	1,008
15 Oct 2014	0	1,008
8 Feb 2015	0	1,008
17 May 2015	0	1,008

Source: Valerie Lincy and Gary Milhollin, “Iran’s Nuclear Timetable,” Wisconsin Project on Nuclear Arms Control, June 17, 2015, <http://www.iranwatch.org/our-publications/articles-reports/irans-nuclear-timetable>.

B. ECONOMIC SANCTIONS VERSUS URANIUM DEVELOPMENT

Evidence indicated a correlation did not exist between an increase in economic sanctions and a decrease in uranium enrichment development. Economic interdiction appeared ineffective at slowing down Iran’s uranium enrichment development thus decreased the time required to build a nuclear weapon. For example, on June 28, 2005, President George W. Bush issued Executive Order (EO) 13382 due to Iran’s nuclear proliferation activities. Iran responded two years later by installing 656 IR-1 centrifuges at Nantanz. Additionally, on November 10, 2008, the U.S. Treasury Department issued further banking rules against Iran; however, Iran continued manufacturing centrifuges and saw increased growth to 2,132. Furthermore, Iranian centrifuges being fed UF6 increased substantially to 3772.⁹⁹ Centrifuges being fed uranium hexafluoride (UF6) further assisted in the enrichment of uranium and the separation of U-235 from U-238. Infusing centrifuges with UF6 was well established as one of the precursors for possible

⁹⁹ United States Department of the Treasury, “An overview of O.F.A.C. Regulations.”

nuclear weapons development as the process is highly technical and decreases the time to manufacture nuclear weapons grade fissile material.¹⁰⁰

The United Nations Security Council (UNSC) passed UNSC Resolution 1929 in June of 2010, which called on all nations to intervene in financial transactions attributable to Iran's nuclear weapons program. On July 1, 2010, President Obama signed the Comprehensive Iran Sanctions, Accountability, and Divestment Act of 2010 (CISADA), which further implemented economic controls on financial institutions working with Iran. However, Iran's IR-1 centrifuge growth rose to 3,610 in November and additional growth was observed in centrifuges being fed UF₆ to 4,816.¹⁰¹

President Barack Obama further sanctioned Iranian banking industries and individuals who were complicit in support of Iranian nuclear facilities in the 2012 National Defense Authorization Act and Executive Order (EO) 13599. President Obama further issued two additional EOs against Iranian banking interests; however, according to the IAEA, Iran increased its operation of 54 cascades of approximately 9,000 first-generation IR-1 centrifuges using UF-6 infusing.¹⁰²

Overall, evidence indicated Iran continued to develop and increase its uranium enrichment program regardless of strong and growing U.S. and international economic sanctions, thus Iran's breakout timeline to a nuclear weapon continued to decrease. Without the recent nuclear agreement between the P5+1 countries and Iran, centrifuge growth and further enrichment would be expected to increase and a nuclear weapon would be imminent.

¹⁰⁰ Houston G. Wood, Alexander Glaser, and R. Scott Kemp, "The Gas Centrifuge and Nuclear Weapons Proliferation," *Physics Today*, September 2008, 40–43.
<http://www.princeton.edu/~rskemp/Kemp%20-%20Gas%20Centrifuge%20and%20Nonproliferation%20-%20SPLG.pdf>.

¹⁰¹ United States Department of the Treasury, "CISADA."

¹⁰² United States Department of the Treasury, "Questions Regarding Executive Order 13599 (Blocking Property of the Government of Iran and Iranian Financial Institutions)," Resource Center, OFAC FAQs, Accessed on April 15, 2015, http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/ques_index.aspx#iraneo.

C. EFFECTS OF ECONOMIC SANCTIONS ON IRAN'S ECONOMY

One of the major impacts of financial interdiction has been the toll on Iran's economy, particularly inflation. Extreme inflation has been caused primarily by the disruption of supply chains and increasing operating costs due the economic sanctions placed by the United States and its partners. According to a June 2015 report by the Iranian Central Bank, inflation was expected to rise by 22.2 percent; however, many economists believe this report is inaccurate and inflation is significantly higher. Recent evidence of extreme increases in food prices is suggestive of higher-than-reported inflation. Further impacting the Iranian economy as a result of economic sanctions is the fall of Iran's currency. The Iranian rial has continually fallen in value against foreign currencies and Iranians are scrambling to acquire U.S. dollars on the black market, which is a sign that Iranians are alarmed at the current state of the economy.¹⁰³

According to Kenneth Katzman from the Congressional Research Service, "broad international sanctions on Iran's key energy and financial sectors harmed Iran's economy and contributed to Iran's acceptance of agreements that exchange constraints on its nuclear program for sanctions relief."¹⁰⁴ Economic sanctions were able to constrict Iran's oil exports from 2.5 million barrels per day in 2011 to 1.1 million in the middle of 2013. Additionally, Iran's economy sunk by 10% until limited sanctions relief was instituted in 2014. In 2014, Iran agreed to the interim nuclear agreement (Joint Plan of Action), which was previously discussed.¹⁰⁵

Many argue Iran's acceptance of the JPOA, and more recent JCPOA, is evidence that economic sanctions have altered Iran's nuclear agenda. However, Iran's nuclear weapons program has continually advanced in the face of economic sanctions, to include advanced ballistic missile technology. Furthermore, according to Principal Deputy Assistant Secretary of State for International Security and Nonproliferation Vann Van

¹⁰³ Sabrina M. Peterson, "Iran's Deteriorating Economy: An Analysis of the Economic Impact of Western Sanctions," *International Affairs Review*, The Elliot School of International Affairs at George Washington University, Accessed on October 13, 2015, <http://www.iar-gwu.org/node/428>.

¹⁰⁴ Katzman, "Iran Sanctions," Summary.

¹⁰⁵ Ibid., Summary.

Diepen, “Iran was still very actively creating front companies and engaging in other activity to conceal procurement.”¹⁰⁶

Other observers have argued economic sanctions have slowed down the procurement and development of Iran’s nuclear program; however, little evidence of that assessment is found and is primarily assumed. Economic sanctions and near economic collapse appear to be one of the primary factors in Iran’s wish to be reintegrated into the international community, which ultimately was proved in the 2013 Iranian election of the most moderate candidate Hassan Rouhani. One of Rouhani’s political platforms was the seeking of economic sanctions relief in exchange for nuclear concessions.¹⁰⁷ Overall, U.S. and international sanctions have negatively impacted Iran’s economy and changed its political landscape, which ultimately led to the P5+1 negotiations and subsequent agreement to suspend Iranian nuclear weapons related programs.

¹⁰⁶ Ibid., 46–47.

¹⁰⁷ Ibid., 47–48.

THIS PAGE INTENTIONALLY LEFT BLANK

V. CURRENT P5+1 AGREEMENT, POLICY RECOMMENDATIONS, AND CONCLUSION

On July 14, 2015, Iran and the P5+1 countries reached a final nuclear agreement. The United States and its partner negotiators were able to secure restrictions on the amount of uranium Iran can store in its stockpile for the next 15 years. The agreement required Iran to reduce its low enriched uranium stockpile by 98 percent. The destination of the low enriched uranium is undetermined, though there is discussion of Russia taking some of the Iranian stockpile. Additionally, the agreement restricted two-thirds of Iran's centrifuge operations at Nantanz.¹⁰⁸ The restriction limits Iran to 5060 operational centrifuges and the remaining offline centrifuges can be used for replacement parts.¹⁰⁹ The restriction in centrifuge enrichment operations extended the amount of time to build a nuclear weapon to one year. Furthermore, the agreement required all questions to be answered concerning Iran's past nuclear operations within three months. However, the agreement is unclear whether IAEA inspectors will be able to interview the Islamic Revolutionary Guard scientists and engineers whom are alleged to have been at the center of designing a nuclear weapon.¹¹⁰

The agreement also addressed the reimplementations of sanctions. Negotiators designed a procedure to "snap back" the sanctions if it was determined that Iran violated the terms of the nuclear agreement. In order to immediately reinstitute economic sanctions, an eight-member panel (the United States, Russia, China, Britain, France, Germany, the European Union, and Iran) would vote by a simple majority to determine if sufficient evidence indicated that Iran is in breach of the agreement and if an investigation is required. If the majority votes in favor of an investigation, the IAEA has

¹⁰⁸ David E. Sanger and Michael R. Gordon, "Iran Nuclear Deal is Reached With World Powers," *New York Times*, July 14, 2015, <http://www.nytimes.com/2015/07/15/world/middleeast/iran-nuclear-deal-is-reached-after-long-negotiations.html>.

¹⁰⁹ Richard Nephew, "Iranian Breakout Timelines in a Comprehensive Deal," Brookings, June 24, 2015, <http://www.brookings.edu/blogs/markaz/posts/2015/06/24-enriched-uranium-flap-iran-nuclear-talks-nephew>.

¹¹⁰ Sanger and Gordon, "Deal Reached in Iran Nuclear Program."

65 days to investigate suspicious activity. In the event illicit activity is found, sanctions relief under the agreement will be immediately reversed.¹¹¹

According to Simon Chin and Valerie Lincy of the Wisconsin Project on Nuclear Arms Control, “The nuclear deal between Iran and the P5+1 reached in Vienna on July 14, 2015 establishes a step-by-step sequence for Iran to receive relief from the sanctions that have crippled its economy.”¹¹² Chin and Lincy reported, economic sanctions that have been the most catastrophic to the Iranian economy will be lifted in months. Though nuclear, missile, and arms restrictions are scheduled to be lifted in five years. However, the Joint Comprehensive Plan of Action and a draft U.N. resolution suggested the arms control sanctions relief could come sooner.¹¹³

Most of the sanctions placed on Iran’s nuclear and missile programs, which are highly important to development of a nuclear weapon, are expected to extend throughout most of the duration of any long-term agreement. The concern is, “unless Iran verifiably stops its illegal nuclear and nuclear-related procurements, it will severely weaken the verifiability and value of a long-term nuclear agreement. Iran could use these black market procurement methods to gather secretly the wherewithal to build covert nuclear plants and to enable a surge in installation of nuclear facilities in case it reneges on the agreement.”¹¹⁴ An additional concern is Iran’s past statements seem to have indicated that they intend to continue its illicit acquisition networks and to continue procuring materials that are illegal.¹¹⁵

¹¹¹ Sanger and Gordon, “Deal Reached in Iran Nuclear Program.”

¹¹² Wisconsin Project on Nuclear Arms Control, “How Iran Could Get Sanctions Relief under the Nuclear Deal Sooner than Anticipated” July 17, 2015, <http://www.iranwatch.org/our-publications/nuclear-iran-weekly/how-iran-could-get-sanctions-relief-under-nuclear-deal-sooner-anticipated>.

¹¹³ Ibid.

¹¹⁴ David Albright, “Iran Admits Illegally Acquiring Goods for its Nuclear Programs,” *Institute for Science and International Security Report*, September 10, 2014, http://isis-online.org/uploads/isis-reports/documents/Albright_Proliferation_Sensitive_Goods_Iran_20Nov2014-Final.pdf.

¹¹⁵ Ibid.

A. POLICY RECOMMENDATIONS

Evidence in the thesis indicated that current U.S.-led financial interdiction is ineffective at curtailing Iran's nuclear enrichment program; however, financial interdiction, coupled with other counterproliferation tools, has ultimately changed Iranian nuclear behavior. In response to these findings, financial interdiction measures must be continually developed and updated to facilitate a more effective counterproliferation weapon. If Iran violates the JCPOA, economic levers must be widened in scope, to include the use against United States allies. Supporting Iran's nuclear weapons program regardless if the support is state sponsored or simply giving companies a safe haven to operate must now be seriously addressed. The United States must give these complicit countries an ultimatum, either continue to have economic ties with a state that is in the process of developing a nuclear weapon or expect the U.S. to sever all economic assistance, to include military cooperation. This option does have some drawbacks. The United States provides many countries with financial assistance, some of which could not survive without these funds. This recommendation could cause a financial vacuum and a potential adversary could fill this void, thus further exacerbating nuclear support. Additionally, some of these countries provide assistance to the U.S. in their geographic area, which supports a wide range of policy goals. This option should be considered if further diplomatic pressure and potential withdraw of financial assistance does not change the targeted country's behavior in its dealings with Iran.

Additional economic interdiction should also include complete oil and trade embargos. Current economic interdiction has not included such extreme measures; however, such measures would add significant political and economic pressure on Iran. This type of interdiction does require broad international support and a coalition willing to assist in such an embargo. In today's current international climate this could prove difficult. A multilateral agreement is the more likely successful approach to this type of increased economic interdiction, though the implementation of an embargo will require significant counterproliferation assets. An additional drawback to this type of overt military action is it may cause Iran to react militarily, because this operation is an

extreme economic measure, which would drastically choke off Iran's economy and more than likely bring complete economic collapse thus causing Iran to act impulsively.

In addition to increasing economic pressure, the United States should develop a more robust offensive economic cyber capability. The U.S. must act more proactively in interfering with Iran's nuclear development in the cyber domain. The U.S. can further impact Iran's economy by interfering with their infrastructure. The targeting of Iran's banking, utility, and manufacturing industries would have significant negative repercussions for their economy. This recommendation could be extremely effective at targeting Iran's behavior and illicit conduct, though there are two potential drawbacks. The increase in offensive cyber attacks could result in an increase of cyber attacks on the U.S. homeland from Iran and their partners. Also, these types of actions could be perceived as an act of war, thus resulting in an armed conflict. Overall, this policy recommendation would be very useful in obtaining a more favorable change in behavior from Tehran.

If diplomatic negotiations and revised economic sanctions do not work to curtail Iran's nuclear weapon development and the United States is truly committed to halting such activity, then military kinetic action is the only viable option left. Military action has many potential risks. One of the major risks in military action against Iran is that it would start a war in the region. War in the Middle East would be catastrophe to the region's economy, and possibly have a ripple effect throughout the global markets. Shipping in and out of the region would be severely impacted by the conflict and ultimately cause the global economy to contract due to an increase in oil prices and other goods. Other drawbacks to conflict in the region include, but are not limited to: Further restrained relations with Russia, Syria, and Hezbollah, and the potential of drawing them into the conflict. If this occurs, the conflict could bleed over into other areas of the Middle East setting off a world war. Additionally, military action would further entrench Iran's nuclear weapons agenda. If this option is used then all other options, to include all counter and nonproliferation tools, have been exhausted and the United States has no choice but to address Iran militarily.

B. CONCLUSION

The United States government's ability to craft and enforce sanctions is limited, and up to this point sanctions have been largely ineffective at stopping further enrichment activities. The United States has only targeted financial institutions that conduct business in or with the U.S. The U.S. government should continue to work diligently within the interagency framework and with international partners to address the design, implementation, and enforcement of sanctions against Iran until lifted under the P5+1 nuclear agreement. U.S.-led economic counterproliferation policy failed at slowing down Iran's enrichment programs, because economic sanctions were not used to the fullest extent possible. However, economic interdiction, along with other counterproliferation tools, ultimately brought Iran to the negotiating table with the P5+1 countries and subsequent agreement by crippling their economy over time.

Regardless of Iran's future actions and adherence to the agreement, the U.S. must continue researching and developing economic sanctions that will generate more effective interdiction operations. One of the major obstacles to any international proposal of economic interdiction is the Iranian relationship with Russia and China. Russia's and China's veto abilities at the United Nation's Security Council and overt assistance to the Iranian regime severely degrades the range of options left for the United States and its allies. Continuing to work bilaterally and multilaterally with U.S. partners, as prior presidential administrations have, will most likely be the only avenue to produce the best results in addressing Iran's behavior.

As evidence indicated, current economic interdiction by itself failed to slow down or halt Iranian centrifuge operations and resulted in a decreased time to build a nuclear weapon. Unless the U.S. can further develop and implement more effective economic and counterproliferation measures, the U.S. and its allies must make preparations for a nuclear-armed Iran. A potential shift in influence and balance of power will cause a ripple effect throughout the Middle East and quite possibly start an arms race in the region. The United States must adapt quickly and effectively to reassure their regional partners that a nuclear-armed Iran does not change the balance of power in the region. If

the United States can formulate a concise foreign policy then an Iranian nuclear weapon introduced into the region would lose some of its potential influence.

**C. ADDITIONAL RESEARCH OF ECONOMIC INTERDICTION
EFFECTIVENESS**

Further research of financial interdiction as a counterproliferation tool against other aspects of Iranian proliferation is warranted. One of those aspects is Iran's ballistic missile program. Research and analysis should be conducted to examine if economic interdiction influenced Iran's efforts at developing a ballistic missile. Additionally, classified research and analysis should be conducted to address Iranian covert procurement of illicit nuclear materials and technologies, and if financial interdiction was effective at stopping covert illicit trade.

LIST OF REFERENCES

- Air University, The. "The Origin of Counterproliferation." Accessed on March 10, 2015.
<http://www.au.af.mil/au/awc/awcgate/xon/definition.htm>.
- Albright, David. "Iran Admits Illegally Acquiring Goods for its Nuclear Programs." *Institute for Science and International Security Report*. September 10, 2014.
http://isis-online.org/uploads/isis-reports/documents/Albright_Proliferation_Sensitive_Goods_Iran_20Nov2014-Final.pdf.
- . "The A.Q. Khan Illicit Nuclear Trade Network and Implications for Nonproliferation Efforts." *Strategic Insights*, v. 5. July 6, 2006.
<https://calhoun.nps.edu/bitstream/handle/10945/11090/albrightJul06.pdf?sequence=1>.
- Anderson, Justin, Thomas Devine, and Rebecca Gibbons. "Nonproliferation and Counterproliferation." *International Relations*. Accessed on March 7, 2015.
<http://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0026.xml>.
- Arms Control Today. "National Strategy to Combat Weapons of Mass Destruction December 2002." January 1, 2003.
<http://www.armscontrol.org/print/1184>.
- Bunn, George. "The Nuclear Nonproliferation Treaty: History and Current Problems." *Arms Control Today*. Accessed on March 7, 2015.
http://www.armscontrol.org/act/2003_12/Bunn.
- Central Intelligence Agency. "Iraq's WMD Programs: Culling Hard Facts from Soft Myths." November 28, 2003. <https://www.cia.gov/news-information/press-releases-statements/press-release-archive-2003/pr11282003.html>.
- Center for Arms Control and Non-proliferation, The. "Fact Sheet: Proliferation Security Initiative." Accessed on February 26, 2015.
http://armscontrolcenter.org/publications/factsheets/fact_sheet_the_proliferation_security_initiative_psi/.
- Council on Foreign Relations. "The Global Nuclear Nonproliferation Regime." June 25, 2013. <http://www.cfr.org/nonproliferation-arms-control-and-disarmament/global-nuclear-nonproliferation-regime/p18984#p3>.
- Davis, Zachary S. "Bombs Away: Interdicting Proliferation." *The American Interest* 4, no. 3. January, 2009.
<http://search.proquest.com/docview/224659156?accountid=12702>.

- Ellis, Jason D. "The Best Defense: Counterproliferation and U.S. National Security." The Center for Strategic and International Studies. *The Washington Quarterly*, 26: 2. <http://wmdcenter.DoDlive.mil/files/2012/02/the-best-defense.pdf>.
- Friedman, Jonah. "The Proliferation Security Initiative: A Model for Future Nonproliferation Efforts?" *Center for Strategic and International Studies Blog*. August 1, 2011. <http://csis.org/blog/proliferation-security-initiative-model-future-nonproliferation-efforts>.
- Institute for Science and International Security. "State Department Cables: Stopping Iran's and North Korea's Illicit Procurement for their Nuclear and Ballistic Missile Programs." December 10, 2010. <http://isis-online.org/isis-reports/detail/state-department-cables-stopping-irans-and-north-koreas-illicit-procurement/8>.
- International Atomic Energy Agency. "Monitoring and Verification in the Islamic Republic of Iran in relation to the extension of the Joint Plan of Action." Board of Governors. December 3, 2014. <https://www.iaea.org/sites/default/files/gov2014-62.pdf>.
- Katzman, Kenneth. "Iran Sanctions." *Congressional Research Service*. August 4, 2015. <https://fas.org/sgp/crs/mideast/RS20871.pdf>.
- Lincy, Valerie, and Gary Milhollin. "Iran's Nuclear Timetable." Wisconsin Project on Nuclear Arms Control. June 17, 2015. <http://www.iranwatch.org/our-publications/articles-reports/irans-nuclear-timetable>.
- Lincy, Valerie, and Simon Chin. "How to Evaluate a Nuclear Deal with Iran." *Nuclear Iran Weekly*. Wisconsin Project on Nuclear Arms Control. July 9, 2015. <http://www.iranwatch.org/our-publications/nuclear-iran-weekly/how-evaluate-nuclear-deal-iran>.
- Mayeda, Andrew. "U.S. Treasury's Puzzle Solver Helps Shape Sanctions Against Iran." *Bloomberg Business*. April 15, 2015. <http://www.bloomberg.com/news/articles/2015-04-16/treasury-s-puzzle-solver-puts-iran-sanctions-picture-together>.
- McColl, Angus. "Is Counterproliferation Compatible with Nonproliferation?" Master Thesis United States Naval Postgraduate School. *Airpower Journal*. Spring 1997. <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj97/spr97/mccoll.html>.
- Mowatt-Larssen, Rolf. "Al Qaeda Weapons of Mass Destruction Threat: Hype or Reality?" Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University. January 2010. http://belfercenter.ksg.harvard.edu/publication/19852/al_qaeda_weapons_of_mass_destruction_threat.html.

- Nacht, Michael. "U.S. Counterproliferation Policy." Wilson Center International Security Studies Minutes. January 27, 2005. <http://www.wilsoncenter.org/event/us-counterproliferation-policy>.
- National Counterproliferation Center. "Iran: Nuclear Intentions and Capabilities." National Intelligence Estimate. November 2007. http://www.counterwmd.gov/files/20071203_release.pdf.
- . "Unclassified Report to Congress on the Acquisition of Technology to Weapons of Mass Destruction and Advanced Conventional Munitions." December 31, 2007. <http://www.counterwmd.gov/files/Unclassified%20Report%20to%20Congress%20WMD%20Covering%20January%20to%2031%20December%202008.pdf>.
- Nephew, Richard. "Iranian Breakout Timelines in a Comprehensive Deal." Brookings Institute. June 24, 2015. <http://www.brookings.edu/blogs/markaz/posts/2015/06/24-enriched-uranium-flap-iran-nuclear-talks-nephew>.
- Niam, Moises. "Illicit: How Smugglers, Traffickers, and Hijacking the Global Economy Copycats Are Hijacking the Global Economy." *Foreign Affairs*. Reviewed by William Wechsler. May/June 2006. <http://www.foreignaffairs.com/articles/61564/william-wechsler/illicit-how-smugglers-traffickers-and-copycats-are-hijacking-the>.
- Nuclear Suppliers Group. Accessed on October 8, 2015. <http://www.nuclearsuppliersgroup.org/en/>.
- Peterson, Sabrina M. "Iran's Deteriorating Economy: An Analysis of the Economic Impact of Western Sanctions." *International Affairs Review*, The Elliot School of International Affairs at George Washington University. Accessed on October 13, 2015. <http://www.iar-gwu.org/node/428>.
- Reva, Bhalla. "Negotiations Behind U.S. Sanctions Against Iran." *Geopolitical Weekly*. STRATFOR Global Intelligence. July 3, 2012. <https://www.stratfor.com/weekly/negotiations-behind-us-sanctions-against-iran>.
- Russell, James A., and James J. Wirtz. *Globalization and WMD Proliferation: Terrorism, Transnational Networks and International Security*. London; New York: Routledge, 2008.
- Sanger, David E., and Michael R. Gordon. "Iran Nuclear Deal is Reached With World Powers." *New York Times*. July 14, 2015. <http://www.nytimes.com/2015/07/15/world/middleeast/iran-nuclear-deal-is-reached-after-long-negotiations.html>.

- Squassoni, Sharon. "Closing Pandora's Box: Pakistan's Role in Nuclear Proliferation." *Arms Control Today*. April 1, 2004.
https://www.armscontrol.org/act/2004_04/Squassoni.
- . "LOOKING BACK: The 1978 Nuclear Nonproliferation Act." *Arms Control Today*. December 4, 2008.
https://www.armscontrol.org/act/2008_12/lookingback_NPT.
- United Nations. 1540 Committee. Accessed on October 12, 2015.
<http://www.un.org/en/sc/1540/>.
- United Nations. "Security Council Imposes Additional Sanctions on Iran, Voting 12 in Favour to 2 Against, with 1 Abstention." United Nations Press Releases. June 9, 2010. <http://www.un.org/press/en/2010/sc9948.doc.htm>.
- . "The Treaty on the Non-Proliferation of Nuclear Weapons." 2010 Review Conference of the Parties to the Treaty. Accessed January 29, 2015,
<http://www.un.org/en/conf/npt/2010/npttext.shtml>.
- United States Department of State. "The Acheson-Lilienthal & Baruch Plans, 1946." Office of the Historian. Accessed on March 10, 2015.
<https://history.state.gov/milestones/1945-1952/baruch-plans>.
- . "Implementation of the Joint Plan of Action." Accessed on April 26, 2015.
<http://www.state.gov/r/pa/prs/ps/2014/01/220054.htm>.
- . "Overview of U.S. Export Control System." A Resource on Strategic Trade Management and Export Controls. Accessed on March 8, 2015.
<http://www.state.gov/strategictrade/overview/>.
- . "Proliferation Security Initiative." Accessed on February 26, 2015.
<http://www.state.gov/t/isn/c10390.htm>.
- United States Department of the Treasury. "An overview of O.F.A.C. Regulations involving Sanctions against Iran." Accessed on April 15, 2015.
<http://www.treasury.gov/resource-center/sanctions/Programs/Documents/wmd.pdf>.
- . "CISADA, The New U.S. Sanctions on Iran." Accessed on April 19, 2015.
http://www.treasury.gov/resource-center/sanctions/Programs/Documents/CISADA_english.pdf.
- . "Executive Order 12613, Prohibiting Imports From Iran." Accessed on April 19, 2015. <http://www.treasury.gov/resource-center/sanctions/Documents/12613.pdf>.

- . “Frequently Asked Questions and Answers.” Resource Center, Sanctions, Answer 1. Accessed on April 16, 2015. <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#1>.
- . “Frequently Asked Questions and Answers.” Resource Center, Sanctions, Answer 207. Accessed on April 16, 2015. <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#207>.
- . “Frequently Asked Questions and Answers,” Resource Center, Sanctions, Answer 216. Accessed on April 15, 2015. <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#216>.
- . “Frequently Asked Questions and Answers.” Resource Center, Sanctions, Answer 313. Accessed on April 15, 2015. <http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/answer.aspx#216>.
- . “Iran Sanctions.” Resource Center. Accessed on April 20, 2015. <http://www.treasury.gov/resource-center/sanctions/Programs/pages/iran.aspx>.
- . “Questions Regarding Executive Order 13599 (Blocking Property of the Government of Iran and Iranian Financial Institutions).” Resource Center, OFAC FAQs. Accessed on April 15, 2015. http://www.treasury.gov/resource-center/faqs/Sanctions/Pages/ques_index.aspx#iraneo.
- . “Specially Designated Nationals List (SDN).” Resource Center. Accessed on April 15, 2015. <http://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx>.
- . “United States Code Annotated
Title 50. War and National Defense Chapter 35. International Emergency Economic Powers.” Accessed on April 26, 2015. <http://www.treasury.gov/resource-center/sanctions/Documents/ieepa.pdf>.
- United States Government Accountability Office. “Report to the Chairman, Committee on Homeland Security and Governmental Affairs, U.S. Senate U.S. and International Sanctions Have Adversely Affected the Iranian Economy.” February 2013. <http://www.gao.gov/assets/660/652314.pdf>.
- United States Institute of Peace. “Timeline of Iran’s Nuclear Activities.” The Iran Primer. Accessed March 15, 2015. <http://iranprimer.usip.org/resource/timeline-irans-nuclear-activities>.
- Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-use Goods and Technologies. Accessed on October 12, 2015. <http://www.wassenaar.org/introduction/howitworks.html>.

- White House Office of the Press Secretary, The. "Executive Order -- Authorizing the Implementation of Certain Sanctions Set Forth in the Iran Freedom and Counter-Proliferation Act of 2012 and Additional Sanctions with Respect To Iran." Accessed on March 7, 2015. <http://www.whitehouse.gov/the-press-office/2013/06/03/executive-order-authorizing-implementation-certain-sanctions-set-forth-i>.
- Winner, Andrew C. "The Proliferation Security Initiative: The New Face of Interdiction." United States Naval War College. <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA520253>.
- Wisconsin Project on Nuclear Arms Control. "How Iran Could Get Sanctions Relief under the Nuclear Deal Sooner than Anticipated." July 17, 2015. <http://www.iranwatch.org/our-publications/nuclear-iran-weekly/how-iran-could-get-sanctions-relief-under-nuclear-deal-sooner-anticipated>.
- . "Illegal Iranian Procurement Network Exposed." Iran Watch. April 21, 2015. <http://www.iranwatch.org/our-publications/nuclear-iran-weekly/illegal-iranian-procurement-network-exposed>.
- Wood, Houston G., Alexander Glaser, and R. Scott Kemp. "The Gas Centrifuge and Nuclear Weapons Proliferation." *Physics Today*. September 2008. <http://www.princeton.edu/~rskemp/Kemp%20-%20Gas%20Centrifuge%20and%20Nonproliferation%20-%20SPLG.pdf>.
- Zarate, Juan Carlos. *Treasury's War: The Unleashing of a New Era of Financial Warfare* New York: Public Affairs, 2013. http://www.strategicstudiesinstitute.army.mil/pubs/Parameters/issues/Winter_2013/9_Zarate.pdf.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California